This document was too large to scan as a whole document, therefore it required breaking into smaller sections.

Document number: SD-WM-DP-054

Section 7 **of** 7

Title: Grout Product Test for Tank 241AP102, 5day & 90 day Runs (Ansi Section)

Date: 1-14-94 **Revision:** A000

Originator: A.P Hammitt, RA St. Denis T.L. Welsh
Co: WHC

Recipient:
Co:

References: EDT-140726

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ANALYTICAL BATCH SUMMARY SHEET

METHOD: **LA-503-156**

DATE START: **December 6, 1993**

PREPARED BY: **L. L. Fritts** LLFritts 12-8-93

DATE COMPLETE: **December 8, 1993**

	UNITS:	uCi/mL							
SPL NAME	SPL ID	ANALYTE	RESULT #1	RESULT #2	AVERAGE	RPD%	%REC	DET LIM	% CT ER
STD 63B43	G754	Am-241	3.29E+1				122.8	1.71E-3	20.4
BLANK	G746	Am-241	<3.40E-5				3.4	3.40E-5	71.0
A-8	G747	Am-241	<3.40E-5				2.7	3.40E-5	58.6
B-8	G748	Am-241	1.18E-4				0.9	3.40E-5	54.2
C-8	G749	Am-241	1.94E-4				0.4	3.40E-5	80.2
D-8	G750	Am-241	<3.40E-5				7.4	3.40E-5	41.2

NARRATIVE: ☐ NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

Rerun G748 and G749--Low tracer recoveries have resulted in actual values.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

*2 2448

Serial No	Sample Point	Date	Time Issued	Priority
G 745.-5582	102 90 BAY	11-20-93	10:49	

Determination	Method Standard	Result Units	Charge Code	Reruns
Am241	LA-503-156	% RECOVERY	VOGEL	

Sample Size	Customer ID
? 100mL - 10 - 1mL + .100mL Spike	STD

Remarks, Calculations, Results

78B43

EDP R201 AR001

STD# 63843 RESULT 32.9

STD VAL 26.796 %REC ~~122.87~~

122.8%

RSO 12-15 OUT FOR RERUN

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
[signature]	[signature]	[signature]		
Hrs	Hrs 12-7-93	Hrs 12-8-93	Hrs	Hrs [signature]

Date	Time Completed	Lab Unit Mgr	
12-6-93		[signature]	[signature]

54-6800-061 (R 10 83)

AM-241: LA-503-156 (D-0) LIQUIDS

Serial No.		STANDARD
	Spike (Tracer) Book Number	78B43
G745-5582	Activity of Am243 Tracer in dpm/mL (SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL (SPKV)	0.1
2264	Volume of Sample in mL (SS)	1
Rerun No.	Dilution Factor (DF)	101
0	Digest Dilution Factor (DDF)	1
Analyst	Am-241 Area Peak Height from AEA (C241)	47
J VANSANT	Am-243 Area Peak Height from AEA (C243)	49
Date	Total AT Count (ATOT)	654
12/06/93	AT Count Time in Minutes (MIN CTd)	30
	Background in CPM (BKG)	6

Am-241 µCi/L = ((C241 * SPKA * SPKV * DF * DDF * (1000mL/L)) / ((C243 * SS * (2220000dpm/mL))

µCi/mL = µCi/L / (1000mL/L)

Tracer % Rec = ((ATOT / MIN CTd - BKG) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100

Relative Counting Error = Square Root of ((1 / C241) + (1/C243)) * 100

BEST AVAILABLE COPY

Am-241 µCi/L	=	3.29E+01
Am-241 µCi/mL	=	3.29E-02
Relative counting error	=	20.4%
Am-243 Tracer Recovery	=	2.1%

Data Entry by: [signature]	Date: 08-Dec-93
Approved by: [signature]	Date: December 8, 1993

Form 3 Rev. 1.2

Page 1 of 1

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#1 12-7-93 AO

G745-5582

654/30 -6

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

#3 3572

Serial No	Sample Point	Date	Time Issued	Priority
G 746-5682	107 90' DAY	11-22-93	13:51	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Am241	LA 503-156	uCi/ML	VOGEL	0

Sample Size	Customer ID
~~1mL~~ .5ml 12-8-93 ~~.119~~ + .100ml Spike 78B43	BLK

Remarks Calculations Results

REAGENT BLANK

COUNT AS uCi/L

"REAT - 400MIN

< 3.40×10^{-5} µCi/ml ATTACH PRINTOUT

OUT FOR RERUN

Analyst	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
VanSant	Johnson	Raymond		
Hrs	Hrs 12-7-93	Hrs 12-8-93	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr	
12-6-93		[signature]	[signature]

54-6800-061 (R-10-83)

AM-241: LA-503-156 (D-0) LIQUIDS

			BLANK
Serial No.	Spike (Tracer) Book Number		78B43
G746-5682	Activity of Am243 Tracer in dpm/mL	(SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL	(SPKV)	0.1
2264	Volume of Sample in mL	(SS)	0.5
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	Am-241 Area Peak Height from AEA	(C241)	2
J VANSANT	Am-243 Area Peak Height from AEA	(C243)	210
Date	Total AT Count	(ATOT)	422
12/06/93	AT Count Time in Minutes	(MIN CTd)	30
	Background in CPM	(BKG)	1

Am-241 µCi/L = ((C241 * SPKA * SPKV * DF * DDF * (1000mL/L)) / ((C243 * SS * (2220000dpm/mL))

µCi/mL = µCi/L / (1000mL/L)

Tracer % Rec = ((ATOT / MIN CTd - BKG) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100

Relative Counting Error = Square Root of ((1 / C241) + (1/C243)) * 100

NOTE: Reported result is a LESS THAN value using 5% of the Am-243 peak as the Am-241 peak.

BEST AVAILABLE COPY

Am-241 µCi/L	=	< 3.40E-02
Am-241 µCi/mL	=	< 3.40E-05
Relative counting error	=	71.0%
Am-243 Tracer Recovery	=	3.4%

Data Entry by: [signature]	Date: 08-Dec-93
Approved by: [signature]	Date: December 8, 1993

Form 3 Rev. 1.2 Page 1 of 1

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#2 12-7-93 AS

422/30 -1

G746-5682

BEST AVAILABLE COPY

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

4 4621

Serial No	Sample Point	Date	Time Issued	Priority
G 747.-5782	102-90 DAY-3	11-22-93		

Determination	Method Standard	Result Units	Charge Code	Reruns
Am241	LA-503-156	uCi/ML	VOGEL	

Sample Size: ? .500mL + .500mL Eoutwag + .100mL spike 78B43

Customer ID: A-

Remarks Calculations Results

COUNT AS uCI/L

<3.40 x 10⁻⁵ μCi/mL

12.13.93 ~~OUT FOR RERUN~~

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
[signature]	[signature]	Raymond		
Hrs	Hrs 12-7-93	Hrs 12.8.93	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr	
12-6-93		[signature]	[signature]

54-6800-061 (R 10 83)

AM-241: LA-503-156 (D-0) LIQUIDS

Serial No.			SAMPLE
G747-5782	Spike (Tracer) Book Number		78B43
Batch ID	Activity of Am243 Tracer in dpm/mL	(SPKA)	7537
2264	Spike (Tracer) Volume in mL	(SPKV)	0.1
Rerun No.	Volume of Sample in mL	(SS)	0.5
0	Dilution Factor	(DF)	1
Analyst	Digest Dilution Factor	(DDF)	1
J VANSANT	Am-241 Area Peak Height from AEA	(C241)	3
Date	Am-243 Area Peak Height from AEA	(C243)	95
12/06/93	Total AT Count	(ATOT)	437
	AT Count Time in Minutes	(MIN CTd)	30
	Background in CPM	(BKG)	4

Am-241 μCi/L = ((C241 * SPKA * SPKV * DF * DDF * (1000mL/L)) / ((C243 * SS * (2220000dpm/mL))
μCi/mL = μCi/L / (1000mL/L)
Tracer % Rec = ((ATOT / MIN CTd - BKG) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100
Relative Counting Error = Square Root of ((1 / C241) + (1/C243)) * 100

NOTE: Reported result is a LESS THAN value using 5% of the Am-243 peak as the Am-241 peak.

BEST AVAILABLE COPY

Am-241 μCi/L	=	< 3.40E-02
Am-241 μCi/mL	=	< 3.40E-05
Relative counting error	=	58.6%
Am-243 Tracer Recovery	=	2.7%

Data Entry by: [signature]	Date: 08-Dec-93
Approved by: [signature]	Date: December 8, 1993

Form 3 Rev. 1.2

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#3 12-7-93 AB

437-4
30

G747-5782

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

#5 5941

Serial No	Sample Point	Date	Time Issued	Priority
G 748-5782	102 90 DAY	11-22-93	13:54	26
Determination	**Method Standard**	**Result Units**	**Charge Code**	**Reruns**
Am241	LA-503-156	uCi/ML	VOGEL	0

Sample Size: .500mL + .500mL Conc HNO3

Customer ID: B-3

Remarks Calculations Results: + .100 spike 78B43

COUNT AS uCi/L

1.18 x 10-4

"AEA" - 480MIN ATTACH PRINTOUT

OUT FOR RERUN

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
VanSant	Johnson	Raymond		
Hrs	Hrs 12-7-93	Hrs 12.8.93	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr	
12-6-93		[signature]	[signature]

54-6800-061 (R-10-83)

AM-241: LA-503-156 (D-0) LIQUIDS

			SAMPLE
Serial No.	Spike (Tracer) Book Number		78B43
G748-5782	Activity of Am243 Tracer in dpm/mL	(SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL	(SPKV)	0.1
2264	Volume of Sample in mL	(SS)	0.5
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	Am-241 Area Peak Height from AEA	(C241)	4
J VANSANT	Am-243 Area Peak Height from AEA	(C243)	23
Date	Total AT Count	(ATOT)	299
12/06/93	AT Count Time in Minutes	(MIN CTd)	30
	Background in CPM	(BKG)	6

Am-241 µCi/L = ((C241 * SPKA * SPKV * DF * DDF * (1000mL/L)) / ((C243 * SS * (2220000dpm/mL))

µCi/mL = µCi/L / (1000mL/L)

Tracer % Rec = ((ATOT / MIN CTd - BKG) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100

Relative Counting Error = Square Root of ((1 / C241) + (1/C243)) * 100

BEST AVAILABLE COPY

Am-241 µCi/L	=	1.18E-01

Am-241 µCi/mL	=	1.18E-04

Relative counting error	=	54.2%

Am-243 Tracer Recovery	=	0.9%

Data Entry by: [signature]	Date: 08-Dec-93
Approved by: [signature]	Date: December 8, 1993

Form 3 Rev. 1.2 Page 1 of 1

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#1 12-7-93 AG

299/30 -6 G748-5782

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

#6 6854

Serial No	Sample Point	Date	Time Issued	Priority
G 749.-5782	103 90 TAY	11-22-93	12:55	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Am241	LA-503-156	uCi/ML	VOGEL	0

Sample Size	Customer ID
.500ml + .500ml Con HNO3	C-8

Remarks Calculations Results

COUNT AS BKT/L + .100 spike 78843

1.94×10^{-4} µCi/ml

ATTACH PRINTOUT

OUT FOR RERUN

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs 12-7-93	Hrs 12.8.93	Hrs	Hrs
Date 12-6-93	Time Completed	Lab Unit Mgr		

54-6800-061 (R-10-83)

AM-241: LA-503-156 (D-0) LIQUIDS

			SAMPLE
Serial No.	Spike (Tracer) Book Number		78B43
G749-5782	Activity of Am243 Tracer in dpm/mL	(SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL	(SPKV)	0.1
2264	Volume of Sample in mL	(SS)	0.5
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	Am-241 Area Peak Height from AEA	(C241)	2
J VAN SANT	Am-243 Area Peak Height from AEA	(C243)	7
Date	Total AT Count	(ATOT)	86
12/06/93	AT Count Time in Minutes	(MIN CTd)	30
	Background in CPM	(BKG)	1

Am-241 µCi/L = ((C241 * SPKA * SPKV * DF * DDF * (1000mL/L)) / ((C243 * SS * (2220000dpm/mL))

µCi/mL = µCi/L / (1000mL/L)

Tracer % Rec = ((ATOT / MIN CTd - BKG) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100

Relative Counting Error = Square Root of ((1 / C241) + (1/C243)) * 100

Am-241 µCi/L	=	1.94E-01
Am-241 µCi/mL	=	1.94E-04
Relative counting error	=	80.2%
Am-243 Tracer Recovery	=	0.4%

Data Entry by:	Date: 08-Dec-93
Approved by:	Date: December 8, 1993

Form 3 Rev. 1.2

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#2 12-7-93 MJ

86/30 -1

G749-5782

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

#7 7384

Serial No	Sample Point	Date	Time Issued	Priority
G 750.-5782	102 90 DAY	11-22-93	12:55	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Am241	LA-503-156	uCi/ML	VOGEL	0

Sample Size	Customer ID
1.500ml + .500ml Control03 + .100 Spike 78B43	D-0

Remarks Calculations Results

COUNT AS uCi/L

$< 3.40 \times 10^{-5}$ uCi/ml 4 COMIN

ATTACH PRINTOUT

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs 12-7-93	Hrs 12.8.93	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
12-6-93		

54-6800-061 (R-10-83)

AM-241: LA-503-156 (D-0) LIQUIDS

Serial No.	Batch ID	Rerun No.	Analyst	Date
G750-5782	2264	0	J VANSANT	12/06/93

			SAMPLE
Spike (Tracer) Book Number			78B43
Activity of Am243 Tracer in dpm/mL	(SPKA)		7537
Spike (Tracer) Volume in mL	(SPKV)		0.1
Volume of Sample in mL	(SS)		0.5
Dilution Factor	(DF)		1
Digest Dilution Factor	(DDF)		1
Am-241 Area Peak Height from AEA	(C241)		6
Am-243 Area Peak Height from AEA	(C243)		318
Total AT Count	(ATOT)		969
AT Count Time in Minutes	(MIN CTd)		30
Background in CPM	(BKG)		4

Am-241 µCi/L = ((C241 * SPKA * SPKV * DF * DDF * (1000mL/L)) / ((C243 * SS * (2220000dpm/mL))

µCi/mL = µCi/L / (1000mL/L)

Tracer % Rec = ((ATOT / MIN CTd - BKG) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100

Relative Counting Error = Square Root of ((1 / C241) + (1/C243)) * 100

NOTE: Reported result is a LESS THAN value using 5% of the Am-243 peak as the Am-241 peak.

Am-241 µCi/L	=	< 3.40E-02
Am-241 µCi/mL	=	< 3.40E-05
Relative counting error	=	41.2%
Am-243 Tracer Recovery	=	7.4%

Data Entry by: Date: 08-Dec-93

Approved by: Date: December 8, 1993

Form 3 Rev. 1.2

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#3 12-7-93 AJ

967/30 - 4

G750-5782

Raymond 12-8-93

Westinghouse Hanford Co.

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REV O

SAMPLE
G745-5582
File ID: 2a2448.CNF

Counted on: 12/ 7/93 @14: 3
Detector: AEA2
Geometry number: 1
Count time: 28805. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Final	Peak center Initial	Final	FWHM Initial	Final	Tau Initial	Final
1	37.2	37.2	298.292	298.292	22.000	16.055	11.000	2.712
2	38.6	38.6	253.519	253.519	26.000	10.847	13.000	2.236

PEAK RESULTS
Peak Error Limit: 25%

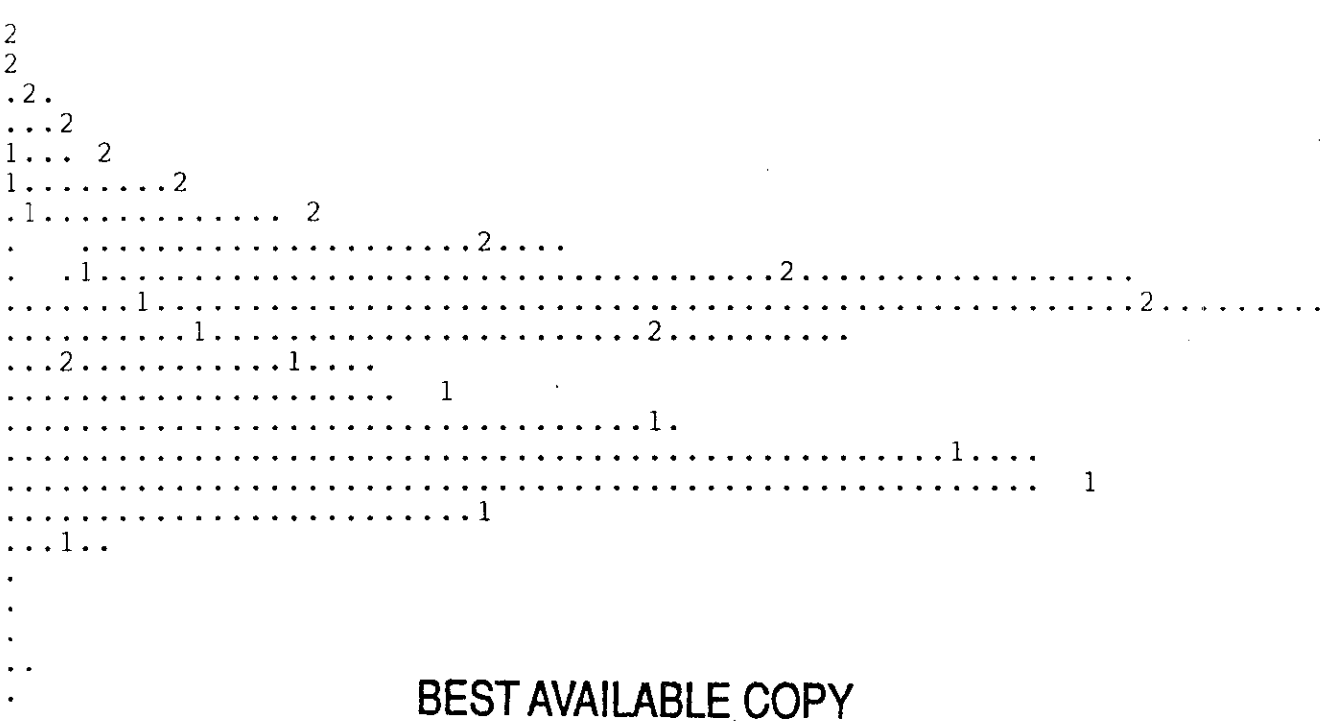
Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1	Am241	0.517	5.480	5.478	0.002	0.08	2.50	5.7	20.5	0.925E-05
	Pu238		5.499	5.478	0.021				26.8	0.121E-04
2	Am243	0.441	5.276	5.268	0.008	0.05	2.14	6.9	16.6	0.749E-05
Totals:		0.957	<--valid peaks only-->				4.64			

DETECTOR CALIBRATION
Energy(MEV) = 4.076 + (0.0047)*Channel
Energy range (MeV): 4.076 TO 6.483
Efficiency = 0.1297 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	2326.0	100.000
Smoothed	2326.0	100.000
Composite fit	2227.1	95.749
Residuals	98.9	4.251

Analyzed by: _____
ALJ



Raw Data Dump for AEA Spectrum: 2a2448.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	2.	0.	0.	1.	0.	0.
31	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	1.	0.	0.	1.	0.	1.	0.	0.	1.
61	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
71	0.	0.	1.	0.	0.	1.	0.	0.	0.	0.
81	0.	0.	1.	0.	0.	0.	1.	0.	2.	0.
91	1.	1.	0.	1.	0.	2.	0.	0.	1.	0.
101	0.	0.	0.	0.	0.	0.	0.	2.	0.	1.
111	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
121	0.	1.	0.	0.	0.	0.	0.	1.	0.	0.
131	0.	0.	0.	1.	0.	1.	0.	1.	1.	0.
141	0.	1.	1.	0.	0.	0.	1.	0.	1.	0.
151	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.
161	2.	0.	0.	1.	1.	0.	1.	0.	1.	1.
171	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
181	1.	0.	0.	0.	1.	2.	2.	1.	0.	0.
191	1.	1.	3.	1.	4.	1.	2.	1.	4.	2.
201	0.	1.	3.	2.	3.	4.	2.	3.	3.	3.
211	4.	2.	3.	3.	2.	1.	5.	5.	8.	2.
221	6.	8.	6.	8.	5.	10.	11.	11.	9.	6.
231	13.	11.	17.	16.	13.	13.	21.	21.	25.	35.
241	23.	33.	37.	41.	41.	39.	46.	38.	49.	42.
251	36.	49.	31.	46.	39.	49.	33.	27.	29.	29.
261	22.	14.	21.	14.	18.	8.	7.	14.	6.	10.
271	10.	16.	10.	9.	13.	9.	16.	12.	12.	21.
281	22.	20.	21.	21.	18.	19.	27.	35.	31.	25.
291	34.	36.	47.	29.	40.	32.	30.	42.	38.	39.
301	26.	34.	28.	25.	13.	18.	21.	14.	15.	5.
311	6.	4.	6.	6.	1.	2.	1.	2.	3.	0.
321	1.	0.	0.	0.	1.	0.	0.	1.	0.	0.
331	1.	3.	0.	1.	0.	1.	0.	1.	1.	3.
341	1.	0.	1.	0.	1.	2.	5.	0.	3.	1.
351	0.	0.	1.	0.	1.	1.	0.	1.	0.	1.
361	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.
431	0.	0.	0.	0.	1.	1.	0.	0.	0.	2.
441	0.	0.	0.	0.	0.	0.	1.	1.	0.	1.
451	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
461	1.	0.	1.	0.	0.	2.	0.	1.	1.	1.
471	2.	2.	1.	1.	0.	3.	0.	0.	0.	1.
481	0.	0.	3.	2.	0.	1.	0.	1.	0.	0.
491	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

12-8-93

Westinghouse Hanford Co.

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REV O

SAMPLE
G746-5682
File ID: 3a3512.CNF

Counted on: 12/ 7/93 @14: 4
Detector: AEA3
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	178.7	178.7	259.095	259.095	14.000	6.988	7.000	3.736

PEAK RESULTS
Peak Error Limit: 25%

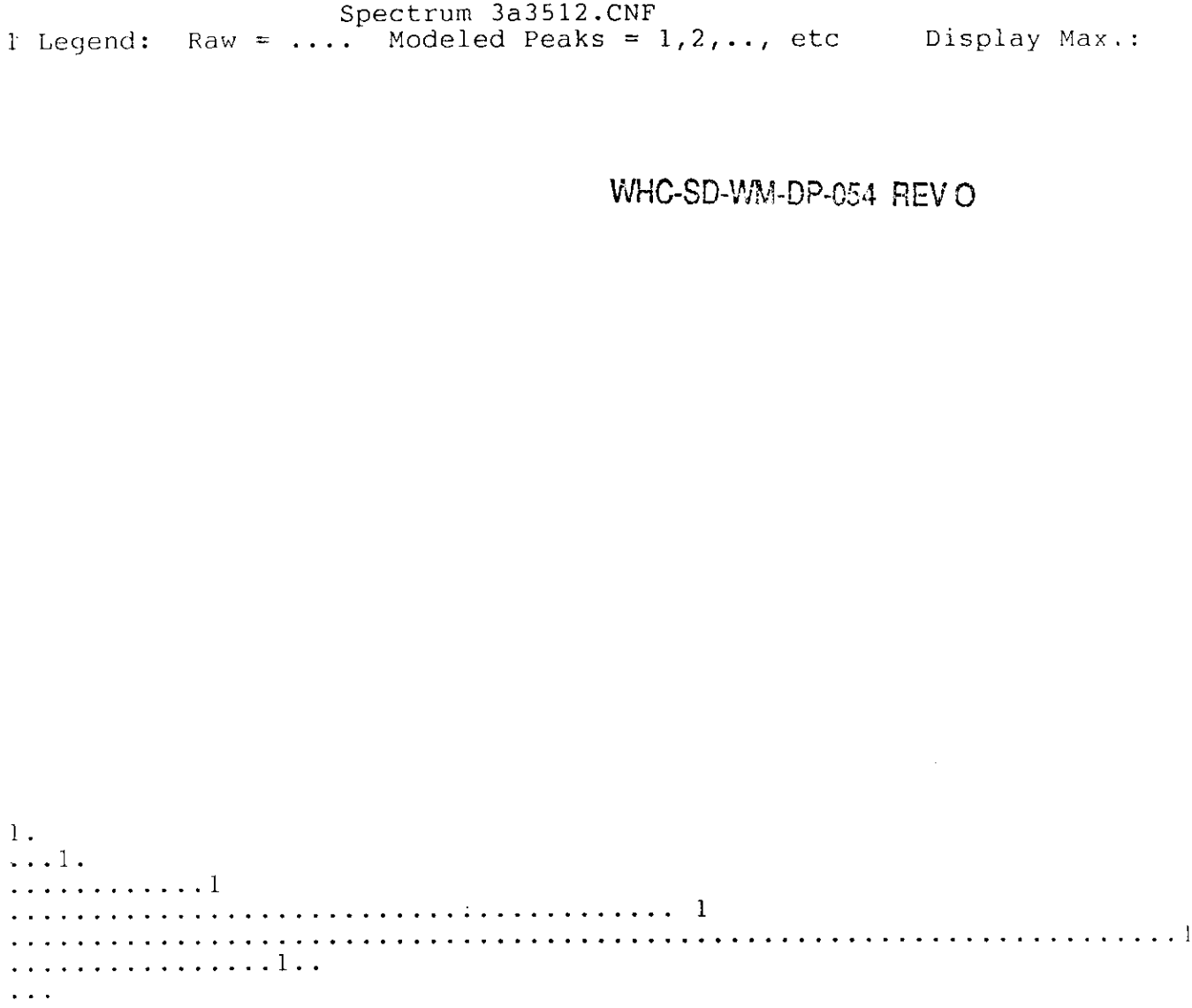
Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1		0.940		5.241	0.03		5.53	3.8	37.6	0.1695-04
Totals:		0.940	<--valid peaks only-->				5.53			

DETECTOR CALIBRATION
Energy(MEV) = 4.049 + (0.0046)*Channel
Energy range (MeV): 4.049 TO 6.404
Efficiency = 0.1473 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	2825.0	100.000
Smoothed	2825.0	100.000
Composite fit	2656.4	94.032
Residuals	168.6	5.968

Analyzed by: _____
ALJ



Raw Data Dump for AEA Spectrum: 3a3512.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
81	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
101	1.	0.	0.	0.	0.	0.	0.	1.	0.	0.
111	1.	0.	0.	0.	0.	0.	0.	0.	0.	2.
121	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
131	0.	0.	1.	1.	0.	1.	0.	0.	1.	0.
141	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
151	0.	0.	1.	0.	1.	0.	0.	0.	1.	1.
161	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
171	0.	0.	0.	0.	1.	0.	1.	1.	0.	0.
181	0.	2.	0.	0.	0.	1.	0.	0.	0.	1.
191	0.	2.	0.	1.	0.	1.	0.	0.	1.	1.
201	0.	0.	0.	1.	1.	2.	0.	1.	2.	3.
211	0.	1.	4.	3.	3.	3.	3.	1.	0.	4.
221	1.	3.	1.	3.	2.	8.	5.	6.	6.	3.
231	6.	5.	11.	8.	14.	9.	9.	14.	18.	17.
241	18.	24.	32.	23.	30.	37.	44.	49.	53.	66.
251	90.	69.	95.	114.	130.	164.	168.	204.	210.	197.
261	155.	148.	139.	85.	52.	43.	39.	17.	10.	12.
271	17.	13.	15.	8.	4.	7.	2.	3.	3.	1.
281	0.	1.	0.	0.	0.	0.	0.	1.	0.	0.
291	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
301	0.	1.	2.	1.	0.	2.	1.	1.	1.	2.
[illegible]	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
331	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
341	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
351	0.	1.	0.	0.	0.	0.	0.	0.	0.	1.
361	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
471	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
481	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

Reynolds
12-8-93

Westinghouse Hanford Co.

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REV 0

SAMPLE
G747-5782
File ID: 4a4021.CNF

Counted on: 12/ 7/93 @14: 4
Detector: AEA4
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	80.5	80.5	255.059	255.059	16.000	8.486	8.000	4.772

PEAK RESULTS
Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1	Am243	0.906	5.276	5.271	0.005	0.04	2.62	5.5	34.5	0.15[illegible]E-04
Totals:		0.906	<--valid peaks only-->				2.62			

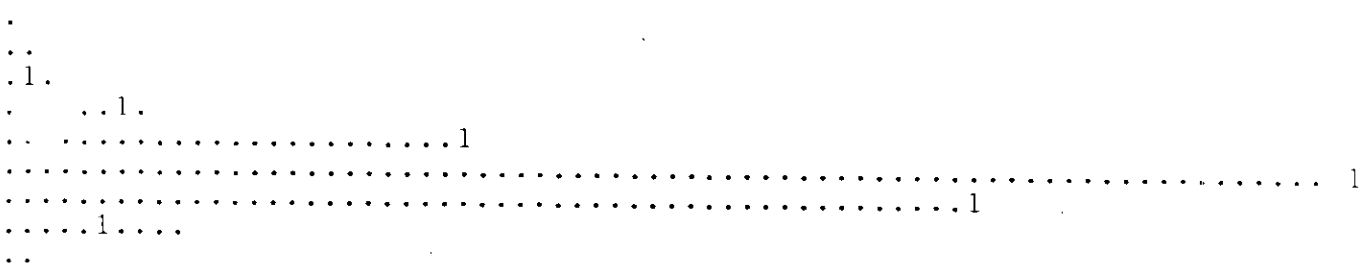
DETECTOR CALIBRATION
Energy(MEV) = 4.072 + (0.0047)*Channel
Energy range (MeV): 4.072 TO 6.479
Efficiency = 0.0768 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	1390.0	100.000
Smoothed	1390.0	100.000
Composite fit	1259.0	90.578
Residuals	131.0	9.422

Analyzed by: _____
ALJ

1 Legend: Raw = ... Modeled Peaks = 1,2,.., etc · Display Max.: 223.9



Raw Data Dump for AEA Spectrum: 4a4021.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
41	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	0.	1.	1.	0.	0.	0.	0.	0.	2.	0.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
81	0.	0.	1.	0.	1.	0.	0.	0.	1.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
101	1.	0.	0.	2.	0.	0.	0.	0.	0.	0.
111	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
121	0.	0.	0.	0.	0.	0.	1.	0.	0.	2.
131	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
141	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
151	0.	1.	0.	1.	1.	0.	0.	1.	0.	0.
161	0.	0.	0.	0.	2.	1.	0.	0.	0.	1.
171	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
181	0.	0.	1.	1.	0.	1.	0.	0.	1.	3.
191	0.	0.	1.	0.	1.	1.	1.	1.	0.	1.
201	0.	1.	0.	1.	1.	2.	2.	0.	1.	1.
211	1.	1.	0.	1.	3.	1.	0.	2.	2.	3.
221	2.	6.	1.	1.	2.	3.	1.	5.	2.	5.
231	3.	1.	6.	3.	6.	3.	11.	13.	14.	16.
241	16.	11.	14.	25.	26.	32.	30.	43.	50.	54.
251	58.	71.	80.	95.	95.	79.	82.	64.	54.	51.
261	37.	28.	19.	15.	11.	2.	5.	6.	10.	6.
271	5.	3.	1.	3.	2.	1.	0.	0.	1.	0.
281	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
291	1.	0.	2.	1.	1.	3.	0.	1.	1.	1.
301	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
311	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.
321	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
331	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
341	0.	2.	1.	0.	0.	0.	0.	0.	2.	1.
351	3.	0.	0.	0.	1.	2.	0.	0.	0.	0.
361	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
371	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
471	0.	0.	0.	0.	1.	1.	1.	0.	1.	0.
481	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

Wagner 12.8.93

Westinghouse Hanford Co.

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REV 0

SAMPLE
G748-5782
File ID: 5a5944.CNF

Counted on: 12/ 7/93 @14: 5
Detector: AEA5
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Final	Peak center Initial	Final	FWHM Initial	Final	Tau Initial	Final
1	15.1	15.1	259.665	256.790	16.000	16.080	8.000	1.736

PEAK RESULTS
Peak Error Limit: 25%

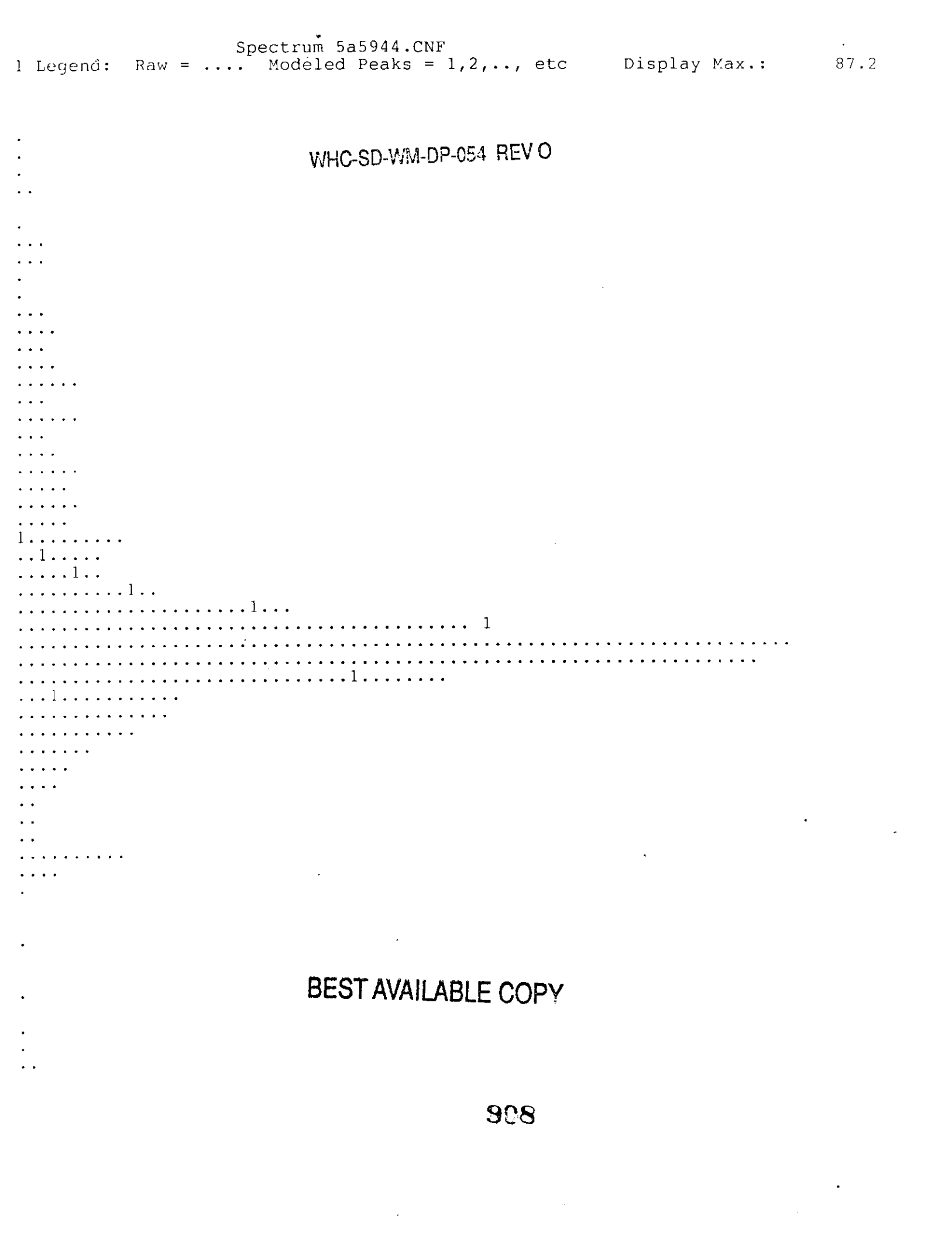
Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1	Am243	0.602	5.276	5.280	-.004	0.07	0.76	10.3	6.6	0.[illegible]
	Pu240		5.144	5.280	-.136				6.6	0.[illegible]
Totals:		0.602	<--valid peaks only-->				0.76			

DETECTOR CALIBRATION
Energy(MEV) = 4.099 + (0.0046)*Channel
Energy range (MeV): 4.099 TO 6.454
Efficiency = 0.1155 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	605.0	100.000
Smoothed	604.3	99.892
Composite fit	363.9	60.156
Residuals	241.1	39.844

Analyzed by: _____
ALJ



Raw Data Dump for AEA Spectrum: 5a5944.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
21	1.	1.	0.	0.	0.	0.	0.	0.	0.	2.
[illegible]	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	1.	0.	1.	2.	0.	0.	0.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	1.	1.	0.	0.	0.	3.	0.	0.	0.	0.
71	1.	0.	1.	1.	0.	0.	0.	0.	1.	3.
81	0.	1.	0.	0.	0.	0.	0.	0.	1.	1.
91	0.	1.	0.	0.	0.	0.	1.	3.	1.	1.
101	0.	0.	0.	0.	1.	0.	2.	0.	0.	1.
111	3.	1.	0.	0.	0.	1.	2.	0.	0.	0.
121	0.	2.	1.	0.	0.	1.	2.	0.	1.	2.
131	1.	1.	1.	1.	1.	1.	2.	0.	0.	1.
141	0.	0.	0.	0.	3.	0.	2.	0.	0.	2.
151	2.	1.	0.	0.	1.	0.	0.	1.	1.	0.
161	0.	0.	0.	0.	2.	0.	2.	3.	2.	0.
171	0.	0.	1.	3.	0.	1.	2.	1.	0.	0.
181	0.	1.	3.	0.	2.	0.	1.	0.	1.	3.
191	1.	0.	1.	1.	0.	0.	0.	1.	2.	2.
201	1.	2.	2.	3.	0.	0.	3.	2.	3.	0.
211	0.	2.	3.	0.	0.	2.	3.	0.	1.	1.
221	3.	0.	3.	0.	1.	3.	2.	1.	3.	1.
231	1.	2.	5.	3.	4.	2.	3.	4.	7.	7.
241	6.	6.	5.	11.	4.	9.	6.	5.	6.	10.
251	11.	8.	10.	23.	13.	10.	21.	14.	10.	10.
261	9.	5.	10.	3.	5.	13.	6.	6.	2.	7.
271	5.	3.	4.	0.	4.	0.	2.	1.	2.	4.
281	1.	1.	3.	3.	2.	3.	5.	1.	0.	1.
291	1.	1.	1.	3.	4.	2.	2.	0.	1.	1.
301	1.	1.	1.	1.	2.	0.	0.	2.	0.	2.
[illegible]	0.	0.	0.	1.	0.	1.	2.	0.	0.	0.
321	3.	0.	0.	0.	1.	0.	0.	0.	0.	0.
331	0.	1.	0.	2.	0.	0.	1.	0.	0.	1.
341	0.	0.	0.	0.	5.	1.	3.	2.	0.	0.
351	4.	1.	1.	1.	0.	1.	0.	0.	0.	1.
361	0.	0.	0.	1.	0.	0.	0.	0.	1.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	1.	0.	0.	1.	0.	0.
391	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.
411	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.
441	0.	1.	1.	0.	0.	0.	0.	0.	1.	0.
451	0.	0.	1.	0.	0.	0.	0.	1.	0.	1.
461	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
471	1.	2.	0.	1.	1.	3.	1.	0.	3.	1.
481	1.	0.	1.	1.	3.	0.	0.	2.	0.	0.
491	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
511	0.	0.								

Rayne, R
12.8.93

Westinghouse Hanford Co.

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REV 0

SAMPLE
G749-5782
File ID: 6a6854.CNF

Counted on: 12/ 7/93 @14: 6
Detector: AEA6
Geometry number: 1
Count time: 28804. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Final	Peak center Initial	Final	FWHM Initial	Final	Tail Init
1	5.3	5.3	261.228	262.021	44.000	28.024	22.

PEAK RESULTS
Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1	Am243	0.594	5.276	5.319	-.043	0.13	0.41	13.9	2.9	0.129E-05
	Pu240		5.144	5.319	-.175				2.8	0.128E-05
Totals:		0.594	<--valid peaks only-->				0.41			

DETECTOR CALIBRATION
Energy(MEV) = 4.088 + (0.0047)*Channel
Energy range (MeV): 4.088 TO 6.494
Efficiency = 0.1457 CPM/DPM

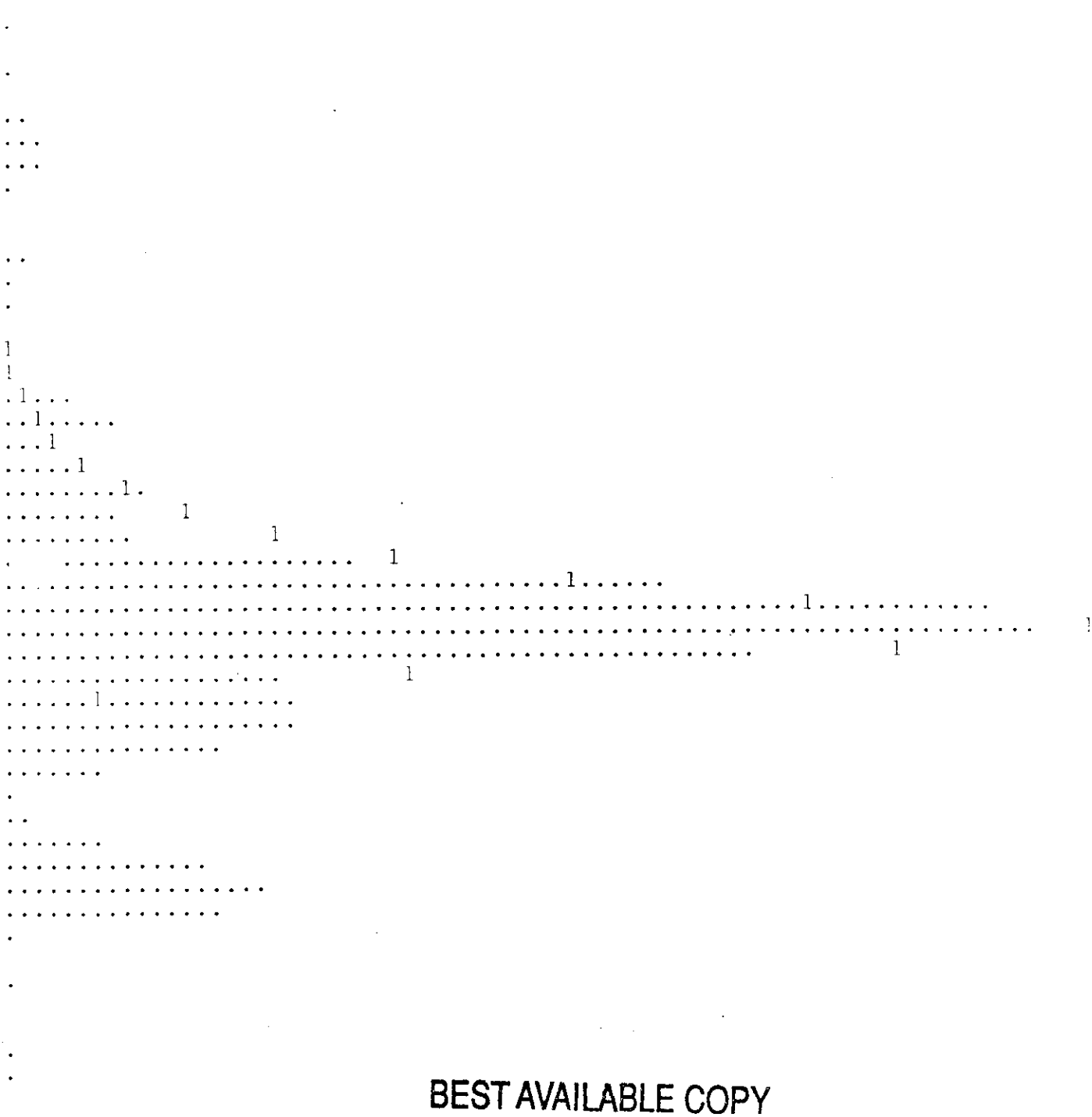
TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	334.0	100.000
Smoothed	327.1	97.933
Composite fit	198.3	59.377
Residuals	135.7	40.623

Analyzed by: _____
ALJ

Spectrum 6a6854.CNF

Legend: Raw = ... Modeled Peaks = 1,2,..,.etc Display Max.: 38.8



Raw Data Dump for AEA Spectrum: 6a6854.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
81	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.
91	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
101	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.
111	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
121	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
131	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.
141	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
151	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
161	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
171	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
181	0.	1.	2.	0.	1.	1.	1.	1.	0.	0.
191	0.	1.	0.	0.	0.	0.	1.	0.	0.	0.
201	1.	0.	0.	0.	0.	1.	2.	1.	0.	0.
211	2.	1.	0.	1.	0.	2.	0.	1.	1.	0.
221	0.	1.	0.	1.	2.	0.	0.	0.	1.	[illegible]
231	2.	1.	0.	3.	0.	2.	2.	0.	[illegible]	[illegible]
241	5.	2.	1.	5.	3.	2.	5.	4.	[illegible]	[illegible]
251	5.	7.	5.	6.	2.	4.	6.	6.	3.	[illegible]
261	2.	6.	6.	4.	6.	2.	4.	4.	4.	1.
271	3.	3.	3.	0.	0.	1.	2.	1.	0.	1.
281	2.	1.	5.	1.	0.	1.	1.	0.	2.	2.
291	2.	1.	1.	2.	1.	1.	1.	2.	3.	0.
301	0.	[illegible]	0.	1.	1.	0.	0.	1.	1.	0.
311	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
321	1.	0.	1.	0.	0.	0.	0.	0.	0.	0.
331	0.	0.	0.	1.	2.	2.	1.	2.	0.	2.
341	0.	0.	2.	1.	1.	2.	0.	1.	2.	1.
351	4.	0.	0.	2.	1.	2.	0.	3.	0.	[illegible]
361	0.	0.	0.	0.	0.	0.	0.	0.	[illegible]	[illegible]
371	0.	0.	0.	0.	0.	0.	1.	0.	0.	[illegible]
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	1.	1.	1.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
441	0.	0.	0.	0.	0.	1.	2.	1.	0.	0.
451	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	1.	0.	1.	0.	0.	1.	0.	2.	[illegible]
471	1.	3.	0.	1.	4.	1.	0.	1.	0.	[illegible]
481	0.	1.	0.	0.	0.	0.	0.	1.	0.	[illegible]
491	0.	1.	0.	0.	2.	8.	4.	0.	0.	[illegible]
511	0.	0.								

Raymond
12.8.93

Westinghouse Hanford Co.

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.01

DATA REDUCTION REPORT

SAMPLE
G750-5782
File ID: 7a7384.CNF

Counted on: 12/ 7/93 @14: 6
Detector: AEA7
Geometry number: 1
Count time: 28802. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	268.8	268.8	256.825	256.825	18.000	9.700	9.000	[illegible]

PEAK RESULTS
Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1	Am243	0.968	5.276	5.264	0.012	0.04	10.19	2.8	84.9	0.382E-04
Totals:		0.968	<--valid peaks only-->				10.19			

DETECTOR CALIBRATION
Energy(MEV) = 4.083 + (0.0046)*Channel
Energy range (MeV): 4.083 TO 6.438
Efficiency = 0.1213 CPM/DPM

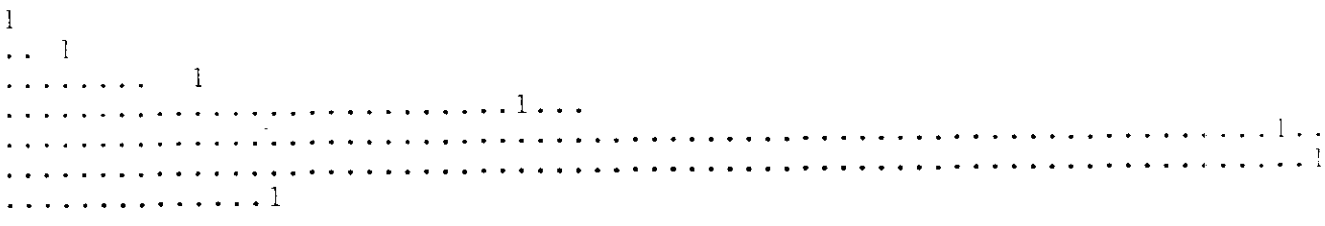
TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	5055.0	100.000
Smoothed	5055.0	100.000
Composite fit	4892.3	96.781
Residuals	162.7	3.219

Analyzed by: _____
ALJ

Spectrum 7a7384.CNF

1 Legend: Raw = ... Modeled Peaks = 1,2,.., etc Display Max.: 1688.2



Raw Data Dump for AEA Spectrum: 7a7384.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
21	1.	0.	0.	0.	0.	1.	0.	0.	0.	0.
31	0.	0.	0.	1.	0.	0.	1.	0.	0.	0.
	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
71	1.	0.	0.	1.	0.	0.	0.	0.	0.	1.
81	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
91	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.
101	0.	0.	1.	1.	0.	1.	0.	0.	0.	0.
111	0.	2.	1.	0.	1.	0.	0.	1.	0.	0.
121	0.	0.	0.	0.	1.	1.	0.	1.	1.	0.
131	0.	0.	0.	1.	1.	0.	0.	0.	1.	0.
141	0.	1.	3.	0.	2.	2.	0.	1.	1.	2.
151	2.	0.	1.	0.	1.	1.	1.	0.	0.	0.
161	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.
171	0.	0.	1.	1.	0.	2.	1.	0.	0.	1.
181	1.	1.	2.	3.	1.	0.	0.	2.	2.	0.
191	1.	1.	1.	0.	0.	1.	0.	0.	2.	1.
201	0.	2.	2.	2.	1.	3.	0.	2.	1.	1.
211	4.	1.	0.	3.	4.	8.	4.	0.	1.	1.
221	3.	5.	1.	6.	5.	5.	8.	10.	4.	11.
231	11.	16.	14.	18.	17.	25.	29.	35.	33.	51.
241	56.	81.	72.	81.	117.	120.	130.	172.	174.	1[illegible].
251	211.	220.	223.	234.	270.	318.	287.	269.	255.	2[illegible].
261	196.	159.	141.	72.	47.	37.	43.	28.	17.	1[illegible].
271	12.	14.	11.	14.	6.	3.	2.	3.	0.	[illegible].
281	0.	1.	0.	1.	0.	0.	3.	4.	3.	1.
291	4.	0.	2.	3.	4.	3.	2.	3.	3.	1.
301	3.	3.	3.	4.	6.	3.	3.	0.	0.	1.
[illegible]	1.	2.	1.	2.	2.	0.	1.	0.	0.	0.
[illegible]	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
331	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
341	0.	1.	1.	0.	1.	1.	0.	0.	0.	1.
351	1.	0.	3.	0.	1.	0.	0.	0.	0.	0.
361	0.	0.	0.	1.	1.	0.	1.	0.	0.	0.
371	0.	1.	0.	0.	0.	0.	0.	0.	0.	[illegible].
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	[illegible].
391	0.	0.	0.	0.	0.	0.	0.	0.	[illegible].	[illegible].
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	[illegible].
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
471	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.
481	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	1.	0.								

90-DAY - BETA ANALYSES

WESTINGHOUSE HANFORD COMPANY Batch 1894

222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No. G-698, G-699, G-700, G-701	Customer ID: A-9, B-9, C-9, D-9
Analysis: TC 99	Sample Prep: Direct

Instrument: WB7818	Procedure/ Rev: LA-438-101 / D-1
Technologist: RG Acher	Date: 10/11/93
Starting Time: 08:30	Temperature 25°C
Ending Time: 14:30	Chemist: Jennifer Slippern

Comments: _____

	Description	Lab ID
1	STD	G-696-5584
2	BK	G-697-5684
3	Sample	G-698-5784
4	Sample	G-699-5784
5	Sample	G-700-5784
6	Sample	G-701-5784
7		
8		
9		
10		

	Description	Lab ID
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS	93BS1 / .250ml			
Pro. Spike	76BS1 / .100ml			
		917		

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ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-438-101

DATE START: OCTOBER 11, 1993

PREPARED BY: JL SLIPPERN

DATE COMPLETE: OCTOBER 20, 1993

	UNITS:	uCi/mL							
SPL NAME	SPL ID	ANALYTE	RESULT #1	RESULT #2	AVERAGE	RPD%	%REC	DET LIM	% CT ER
93B51	G696	Tc99	3.48				95.9	3.23E-5	1.5
BLANK	G697	Tc99	<8.38E-6				68.2	8.38E-6	5.6
A-9	G698	Tc99	<8.14E-6				70.1	8.14E-6	6.0
B-9	G699	Tc99	3.94E-4				70.0	8.15E-6	2.1
C-9	G700	Tc99	3.79E-4				70.6	8.09E-6	2.2
D-9	G701	Tc99	4.64E-4				70.4	8.10E-6	2.0

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

1#2

Serial No	Sample Point	Date	Time Issued	Priority
G 696.-5584	102 90 DAY	9-23-93	14:46	26

Determination	Method-Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	% RECOVERY	D44B3	0

Sample Size: ? .250 ml Spike #76B51 vol - .100 ml

Customer ID: STD

Remarks Calculations Results

EDP S363 TC99

STD#93B51 RESULT 3.48

STD VAL 3,627 %REC 95.9%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
[signature]	[signature]	[signature]		
Hrs	Hrs 10-11-93 16:30	Hrs 10-12-93	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr	
10/11/93	14:30	[signature] CA Clark	[signature] 10/18

54-6400-061

Tc-99: LA-438-101 (D-1) LIQUIDS

			STANDARD
Serial No.	Spike (Tracer) Book Number		76B51
G696-5584	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	0.25
1894	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	910.8839
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4757.867
	Background cpm	(BKG cpm)	55.5
Date	Background Time Counted in Minutes	(BKG time)	20
10/11/93	Instrument Fractional Efficiency	(EFF)	0.9346
	Detection Limit	(Ld)	8.45
	Critical Level	(Lc)	3.88
	Tc–99 Concentration in µCi/L =		3.4774E+00

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 – dm1))

Tc–99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 – dm1))

Tc–99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 – dm1) * 1.5 * 100 / dm3

BEST AVAILABLE COPY

Tc–99 Concentration in µCi/L =	3.48E+00	DETECTION LEVEL
Tc–99 Concentration in µCi/mL =	3.48E-03	3.23E-05
Spike (Tracer) Recovery =	70.8%	µCi/mL

Data Entry by:	CA Clark	Date:	12-Oct-93
Approved by:	[signature]	Date:	20-Oct-93

Form 1 Rev. 2.0

Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

3+4

Serial No	Sample Point	Date	Time Issued	Priority
G 697.-5684	102 90 DAY	9-23-93	14:59	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
? /ml	BLK

Remarks Calculations Results

REAGENT BLANK

COUNT AS uCI/L

<8.38 E-6 uCi/mL

Spike # 76B51

Vol - .100ml

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs 10-11-93 16:30	Hrs 10-12-93	Hrs	
Date 10/11/93	Time Completed 14:30	Lab Unit Mgr		

CQ Clerk

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.			BLANK
G697-5684	Spike (Tracer) Book Number		76B51
Batch ID	Activity for 100µl of Spike Added in dpm	(dm3)	8151
1894	Volume of Sample in mL	(SS)	1
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	dpm of Sample from Liquid Scintillation Counter	(dm1)	7.903563
	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	3711.69
	Background cpm	(BKG cpm)	55.5
Date	Background Time Counted in Minutes	(BKG time)	20
10/11/93	Instrument Fractional Efficiency	(EFF)	0.9346
	Detection Limit	(Ld)	8.45
	Critical Level	(Lc)	3.88
	Tc-99 Concentration in µCi/L =	<	8.3781E-03

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	< 8.38E-03	
Tc-99 Concentration in µCi/mL	=	< 8.38E-06	8.38E-06 µCi/mL
Spike (Tracer) Recovery	=	68.2%	

Data Entry by:	CA Clerk	Date:	12-Oct-93
Approved by:		Date:	10/20/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

5-86

Serial No	Sample Point	Date	Time Issued	Priority
G 698.-5784	102 90 DAY	9-23-93	15: 6	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
? / ml	A-9

Remarks Calculations Results

COUNT AS uCI/L
Spike #76851
Vol - .100 ml

< 8.14 E-6 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
		Raymond		
Hrs	Hrs 10-11-93 16:30	Hrs 10.12.93	Hrs	Hrs
Date 10/11/93	Time Completed 14:30	Lab Unit Mgr CA Clark		

54-6800-067 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.	Batch ID	Rerun No.	Analyst	Date
G698-5784	1894	0		10/11/93

			SAMPLE
Spike (Tracer) Book Number			76851
Activity for 100µl of Spike Added in dpm	(dm3)		8151
Volume of Sample in mL	(SS)		1
Dilution Factor	(DF)		1
Digest Dilution Factor	(DDF)		1
dpm of Sample from Liquid Scintillation Counter	(dm1)		1.123425
dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)		3810.601
Background cpm	(BKG cpm)		55.5
Background Time Counted in Minutes	(BKG time)		20
Instrument Fractional Efficiency	(EFF)		0.9355
Detection Limit	(Ld)		8.44
Critical Level	(Lc)		3.88
Tc-99 Concentration in µCi/L	=	<	8.1378E-03

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	< 8.14E-03	
Tc-99 Concentration in µCi/mL	=	< 8.14E-06	8.14E-06 µCi/mL
Spike (Tracer) Recovery	=	70.1%	

Data Entry by:	CA Clark	Date:	12-Oct-93
Approved by:		Date:	10/20/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

786

Serial No	Sample Point	Date	Time Issued	Priority
G 699.-5784	102 90 DAY	9-23-93	15: 6	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
? / ml	B-9

Remarks Calculations Results

COUNT AS uCI/L

Spike # 76851

~~.01~~ .100 ml

Vol

3.94 E-4 µCi/mL

Analyst	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs 10-11-93 16:30	Hrs 10.12.93	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/11/93	1430	10/18

PB Chart

54-6800-661 (REV 0-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.	Batch ID	Rerun No.	Analyst	Date
G699-5784	1894	0		10/11/93

			SAMPLE
Spike (Tracer) Book Number			76B51
Activity for 100µl of Spike Added in dpm	(dm3)		8151
Volume of Sample in mL	(SS)		1
Dilution Factor	(DF)		1
Digest Dilution Factor	(DDF)		1
dpm of Sample from Liquid Scintillation Counter	(dm1)		407.8856
dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)		4209.604
Background cpm	(BKG cpm)		55.5
Background Time Counted in Minutes	(BKG time)		20
Instrument Fractional Efficiency	(EFF)		0.9355
Detection Limit	(Ld)		8.44
Critical Level	(Lc)		3.88
Tc-99 Concentration in µCi/L	=		3.9393E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	3.94E-01	
Tc-99 Concentration in µCi/mL	=	3.94E-04	8.15E-06 µCi/mL
Spike (Tracer) Recovery	=	70.0%	

Data Entry by:	CB Clark	Date:	12-Oct-93
Approved by:		Date:	10/20/93

Form 1 Rev. 2.0

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

9870

Serial No	Sample Point	Date	Time Issued	Priority
G 700.-5784	102 90 DAY	9-23-93	15: 6	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101.	uCi/ML	D44B3	0

Sample Size	Customer ID
? / ml	C-9

Remarks, Calculations, Results

COUNT AS uCI/L

Spike #761351

101 - .100 mL

3.79 E-4 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs 10-11-93 16:30	Hrs 10.12.93	Hrs	Hrs
Date 10/11/93	Time Completed 14:30	Lab Unit Mgr		10/18

54-6800-851 (R-10-83)

CA Clark

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.	Batch ID	Rerun No.	Analyst	Date
G700-5784	1894	0		10/11/93

			SAMPLE
Spike (Tracer) Book Number			76B51
Activity for 100µl of Spike Added in dpm	(dm3)		8151
Volume of Sample in mL	(SS)		1
Dilution Factor	(DF)		1
Digest Dilution Factor	(DDF)		1
dpm of Sample from Liquid Scintillation Counter	(dm1)		395.8392
dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)		4230.445
Background cpm	(BKG cpm)		55.5
Background Time Counted in Minutes	(BKG time)		20
Instrument Fractional Efficiency	(EFF)		0.9346
Detection Limit	(Ld)		8.45
Critical Level	(Lc)		3.88
Tc-99 Concentration in µCi/L	=		3.7901E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	3.79E-01	
Tc-99 Concentration in µCi/mL	=	3.79E-04	8.09E-06 µCi/mL
Spike (Tracer) Recovery	=	70.6%	

Data Entry by:	CA Clark	Date:	12-Oct-93
Approved by:		Date:	10/20/93

Form 1 Rev. 2.0

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

11/5/2

Serial No	Sample Point	Date	Time Issued	Priority
G 701.-5784	102 90 DAY	9-23-93	15: 7	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
? / ml	D-9

Remarks Calculations Results

COUNT AS uCI/L
Spike # 76B51
Vol - .100 ml

4.64 E-4 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs 10-11-93 16:30	Hrs 10.12.93	Hrs	Hrs
Date 10/11/93	Time Completed 14:30	Lab Unit Mgr		

CA Mark

54-6800-061 (R/10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.	Batch ID	Rerun No.	Analyst	Date
G701-5784	1894	0	;	10/11/93

			SAMPLE
Spike (Tracer) Book Number			76B51
Activity for 100µl of Spike Added in dpm	(dm3)		8151
Volume of Sample in mL	(SS)		1
Dilution Factor	(DF)		1
Digest Dilution Factor	(DDF)		1
dpm of Sample from Liquid Scintillation Counter	(dm1)		483.7078
dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)		4309.556
Background cpm	(BKG cpm)		55.5
Background Time Counted in Minutes	(BKG time)		20
Instrument Fractional Efficiency	(EFF)		0.9355
Detection Limit	(Ld)		8.44
Critical Level	(Lc)		3.88
Tc-99 Concentration in µCi/L	=		4.6421E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	4.64E-01	
Tc-99 Concentration in µCi/mL	=	4.64E-04	8.10E-06 µCi/mL
Spike (Tracer) Recovery	=	70.4%	

Data Entry by:	CA Mark	Date:	12-Oct-93
Approved by:		Date:	10/20/93

Raymond
10-12-93

USER: Y ID: TC 99 PRESET TIME: 20.00 MON [illegible] OCT 199[illegible] [illegible]
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR: N RS232: N
H#: 1 AQC: Y DCF: N RCM: Y 2 PHASE MONITOR: N
[illegible]

UNKNOWN ID: TC 99 UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR ISO1: 0 1.00000
UNKNOWN UNITS ISO1: DPM
UNKNOWN HALF LIFE CORRECTION: N
INDIVIDUAL UNKNOWN NORM FACTORS: N BACKGROUND QUENCH CURVES: Y
STANDARD ID: 131B28-A 1-10 QUENCH LIMITS LOW: 73.67 HIGH: 20[illegible]
HALF LIFE (DAYS) ISO1: N
STANDARD DPM ISO1: 0.0000000

BACKGROUND QUENCH CURVES: CONSTANT

BEST AVAILABLE COPY

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: [illegible] B: [illegible] C: [illegible] D: [illegible]

BACKGROUND QUENCH CURVE CORRELATION TABLE

POS	H#	MEASURED CPM	CALCULATED CPM	PERCENT DIFF.	[illegible]
1	140.0	55.50	55.50	0.00	

BACKGROUND QUENCH LIMITS LOW: 0.000 HIGH: 1000.
TOTAL QUENCH LIMITS LOW: 73.67 HIGH: 20[illegible]

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM	CHR
1	**- 3	1	905.45	1.49	20.00	42.16	160.0	0.59	
	ISO1 %EFF CH1: 93.31						ISO1 DPM: 910.38[illegible]		
2	**- 4	1	4502.40	0.67	20.00	63.29	158.0	0.14	
	ISO1 %EFF CH1: 93.46						ISO1 DPM: [illegible]		
[illegible]	[illegible] 5	1	62.90	5.64	20.00	84.40	15[illegible]	[illegible]	
	[illegible]						[illegible]		
[illegible]	**- 6	1	[illegible]	0.75	20.00	[illegible]	[illegible]	[illegible]	
	ISO1 %EFF CH1: 93.46						ISO1 DPM: [illegible]		

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG AM		SAM
5	**- 7	1	56.35	5.99	20.00	126.59	159.0	20.04	
	ISO1	%EFF	CH1:97.45				ISO1 DPM	:1 [illegible]	
7	**- 9	1	436.10	2.14	20.00	168.65	160.0	1.44	
	ISO1	%EFF	CH1:93.31				ISO1 DPM	:407.905.	
8	**-10	1	3993.40	0.71	20.00	189.96	157.0	0.22	
	ISO1	%EFF	CH1:93.55				ISO1 DPM	:4209.604	
9	**-11	1	426.45	2.17	20.00	211.05	155.0	1.46	
	ISO1	%EFF	CH1:93.71				ISO1 DPM	:[illegible]	
[illegible]									
12	**- 2	1	4086.90	0.70	20.00	274.46	157.0	0.13	
	ISO1	%EFF	CH1:93.55				ISO1 DPM	:430[illegible]	

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WESTINGHOUSE HANFORD COMPANY Batch 1955

222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.	Customer ID:
G-720, G-721, G-722, G-723	A-10, B-10, C-10, D-10
Analysis: TC 99	Sample Prep: Direct

Instrument: WS97818	Procedure/ Rev: LA-438-101 / D-1
Technologist: RG Archer	Date: 10/22/93
Starting Time: 08:30	Temperature 25°C
Ending Time: 15:00	Chemist: Jennifer Slippern

Comments: _____

	Description	Lab ID
1	STD	G-718-5584
2	BIK	G-719-5584
3	Sample	G-720-5784
4	Sample	G-721-5784
5	Sample	G-722-5784
6	Sample	G-723-5784
7		
8		
9		
10		

	Description	Lab ID
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS	93851 / .25ml			
Pro. Spike	76150 / .100ml			
		927		

(A)

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA438-101

DATE START: OCTOBER 22, 1993

PREPARED BY: J.L. SLIPPERN 10/27/93

DATE COMPLETE: OCTOBER 27, 1993

	UNITS:	uCi/mL										
SPL NAME	SPL ID	ANALYTE	RESULT #1	RESULT #2	AVERAGE	RPD%	%REC #1	%REC #2	DET LIM #1	DET LIM #2	% CT ER #1	% CT ER #2
STD 93B51	G718	Tc99	3.25				89.6		2.75E-05		1.4	
BLANK	G719	Tc99	1.47E-05				81.6		7.04E-06		5.2	
A-10	G720	Tc99	<7.07E-06				81.1		7.07E-06		5.9	
B-10	G721	Tc99	3.15E-04				81.0		7.08E-06		2.2	
C-10	G722	Tc99	2.84E-04				82.6		6.94E-06		2.3	
D-10	G723	Tc99	3.11E-04				80.6		7.11E-06		2.2	

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

1-2

Serial No	Sample Point	Date	Time Issued	Priority
G 718.-5584	102 90. DAY	10-15-93	9:43	25

Determination	Method-Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	% RECOVERY	D44B3	0

Sample Size	Customer ID
? .250 ml	STD

Remarks, Calculations, Results

EDP S363 TC99

STD# 73B51 RESULT 3.25

STD VAL 3.627 %REC 89.6

spike ID-76B51

spike vol - .100ml

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
[signature]	D.H. Milner	[signature]		
	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/22/93	15:00	[signature]

54-6800-067 (10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

		STANDARD
Serial No.	Spike (Tracer) Book Number	76B51
G718-5584	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	0.25
1955	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	1003.495
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	5532.269
ROD ACHEN	Background cpm (BKG cpm)	57
Date	Background Time Counted in Minutes (BKG time)	20
10/22/93	Instrument Fractional Efficiency (EFF)	0.9431
	Detection Limit (Ld)	8.49
	Critical Level (Lc)	3.93
	Tc-99 Concentration in µCi/L =	3.2543E+00

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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		DETECTION LEVEL
Tc-99 Concentration in µCi/L =	3.25E+00	
Tc-99 Concentration in µCi/mL =	3.25E-03	2.75E-05
Spike (Tracer) Recovery =	83.3%	µCi/mL

Data Entry by:	[signature]	Date:	25-Oct-93
Approved by:	[signature]	Date:	10/27/93

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PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

3-4

Serial No	Sample Point	Date	Time Issued	Priority
G 719.-5684	102 90 DAY	10-15-93	9:46	[illegible]

Determination	Method/Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
? / ml	BLK

Remarks Calculations Results

REAGENT BLANK

COUNT AS uCI/L

Spike ID-76B51

Spike vol- .100ml

1.47E-5 uCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
[signature]	[signature] Hrs	[signature] Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/22/93	15:00	[signature] 10/23

54-6800-261 (R 10 83)

Tc-99: LA-438-101 (D-1) LIQUIDS

		BLANK
Serial No.	Spike (Tracer) Book Number	76B51
G719-5684	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
1955	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	17.71495
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4453.103
ROD ACHEN	Background cpm (BKG cpm)	57
Date	Background Time Counted in Minutes (BKG time)	20
10/22/93	Instrument Fractional Efficiency (EFF)	0.9416
	Detection Limit (Ld)	8.50
	Critical Level (Lc)	3.93
	Tc-99 Concentration in µCi/L =	1.4664E-02

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

BEST AVAILABLE COPY

		DETECTION LEVEL
Tc-99 Concentration in µCi/L =	1.47E-02	
Tc-99 Concentration in µCi/mL =	1.47E-05	7.04E-06
Spike (Tracer) Recovery =	81.6%	µCi/mL

Data Entry by:	[signature]	Date:	25-Oct-93
Approved by:	[signature]	Date:	10/27/93

Form 1 Rev. 2.0

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

5-6

Serial No	Sample Point	Date	Time Issued	Priority
G 720.-5784	102 90-DAY.	10-15-93	9:47	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
? / ml	A-10

Remarks Calculations Results

COUNT AS uCI/L

Spike ID- 76851
Spike vol- .1000 ml

< 7.07 E-6 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/22/93	15:00	

54-6400-761 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.	Batch ID	Rerun No.	Analyst	Date
G720-5784	1955	0	ROD ACHEN	10/22/93

			SAMPLE
Spike (Tracer) Book Number			76851
Activity for 100µl of Spike Added in dpm	(dm3)		8151
Volume of Sample in mL	(SS)		1
Dilution Factor	(DF)		1
Digest Dilution Factor	(DDF)		1
dpm of Sample from Liquid Scintillation Counter	(dm1)		0
dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)		4404.977
Background cpm	(BKG cpm)		57
Background Time Counted in Minutes	(BKG time)		20
Instrument Fractional Efficiency	(EFF)		0.9431
Detection Limit	(Ld)		8.49
Critical Level	(Lc)		3.93
Tc-99 Concentration in µCi/L	=	<	7.0731E-03

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).

Tc-99 Concentration in µCi/L	=	< 7.07E-03	DETECTION LEVEL
Tc-99 Concentration in µCi/mL	=	< 7.07E-06	7.07E-06 µCi/mL
Spike (Tracer) Recovery	=	81.1%	

Data Entry by:		Date:	25-Oct-93
Approved by:		Date:	10/27/93

Form 1 Rev. 2.0

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

7-8

Serial No	Sample Point	Date	Time Issued	Priority
G 721.-5784	102 90 DAY	10-15-93	9:50	26

Determination	Method-Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
2 / ml	B-10

Remarks Calculations Results

COUNT AS uCI/L

Spike ID - 76851

Spike Vol - .100 ml

~~7.08 E-6 µCi/mL~~ 98 10/27/93

3.16 E-4 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/22/93	15:00	10/25

54-6000-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.	Batch ID	Rerun No.	Analyst	Date
G721-5784	1955	0	ROD ACHEN	10/22/93

			SAMPLE
Spike (Tracer) Book Number			76851
Activity for 100µl of Spike Added in dpm	(dm3)		8151
Volume of Sample in mL	(SS)		1
Dilution Factor	(DF)		1
Digest Dilution Factor	(DDF)		1
dpm of Sample from Liquid Scintillation Counter	(dm1)		378.9085
dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)		4778.491
Background cpm	(BKG cpm)		57
Background Time Counted in Minutes	(BKG time)		20
Instrument Fractional Efficiency	(EFF)		0.9431
Detection Limit	(Ld)		8.49
Critical Level	(Lc)		3.93
Tc-99 Concentration in µCi/L	=		3.1621E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	3.16E-01	
Tc-99 Concentration in µCi/mL	=	3.16E-04	7.08E-06 µCi/mL
Spike (Tracer) Recovery	=	81.0%	

Data Entry by: Date: 25-Oct-93

Approved by: Date: 10/27/93

Form 1 Rev. 2.0

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

9-10

Serial No	Sample Point	Date	Time Issued	Priority
G 722.-5784	102 90 DAY	10-15-93	9:50	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
? 1 ml	C-10

Remarks Calculations Results

COUNT AS uCI/L

Spike vol - 100ml

Spike ID - 76B51

2.84E-4 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
[signature]	D.H. [signature]	[signature]		
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/22/93	15:00	[signature] 10/25

54-6000-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

			SAMPLE
Serial No.	Spike (Tracer) Book Number		76B51
G722-5784	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	1
1955	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	347.1517
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4835.365
ROD ACHEN	Background cpm	(BKG cpm)	57
Date	Background Time Counted in Minutes	(BKG time)	20
10/22/93	Instrument Fractional Efficiency	(EFF)	0.9431
	Detection Limit	(Ld)	8.49
	Critical Level	(Lc)	3.93
	Tc-99 Concentration in µCi/L =		2.8399E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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		DETECTION LEVEL
Tc-99 Concentration in µCi/L =	2.84E-01	
Tc-99 Concentration in µCi/mL =	2.84E-04	6.94E-06
Spike (Tracer) Recovery =	82.6%	µCi/mL

Data Entry by:	[signature]	Date:	25-Oct-93
Approved by:	[signature]	Date:	10/27/93

Form 1 Rev. 2.0 Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

11-12 WHC-SD-WM-DP-054 REV 0

Serial No	Sample Point	Date	Time Issued	Priority
G 723.-5784	102 90 DAY	10-15-93	9:51	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	D44B3	0

Sample Size	Customer ID
~~1.250 ml~~ PEA 10/22/93 1 ml	D-10

Remarks, Calculations, Results

COUNT AS uCI/L
Spike ID — 76B51
Spike Vol — .100 ml
3.11 E-4 uCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	D.A. Millican Hrs	Em Bracco Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/22/93	15:00	10/25

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.			SAMPLE
G723-5784	Spike (Tracer) Book Number		76B51
Batch ID	Activity for 100µl of Spike Added in dpm	(dm3)	8151
1955	Volume of Sample in mL	(SS)	1
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	dpm of Sample from Liquid Scintillation Counter	(dm1)	371.4757
ROD ACHEN	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4753.448
Date	Background cpm	(BKG cpm)	57
10/22/93	Background Time Counted in Minutes	(BKG time)	20
	Instrument Fractional Efficiency	(EFF)	0.9434
	Detection Limit	(Ld)	8.48
	Critical Level	(Lc)	3.93
	Tc-99 Concentration in µCi/L =		3.1126E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	3.11E-01	
Tc-99 Concentration in µCi/mL	=	3.11E-04	7.11E-06 µCi/mL
Spike (Tracer) Recovery	=	80.6%	

Data Entry by: Date: 25-Oct-93
Approved by: Date: 10/27/93

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10-23-93

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WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY

Batch 2316

ANALYTICAL BATCH

Lab Segment Serial No.	Customer ID:
G747 G748 G749 G750 G751	~~A8~~ A3-B3-C3-D3
Analysis: TC 99	Sample Prep:

Instrument: WC 2916 WC 16055	Procedure/ Rev: LA-223-101 / D-1
Technologist: RDMeyers RJMeyer	Date: 11/30/93
Starting Time: 0800	Temperature N/A
Ending Time: 1415	Chemist: Catlin

Comments: _____

	Description	Lab ID
1	LMCS	G745.5364
2	BLK	G746.5365
3	Sample	G747.5366
4	Sample	G748.5367
5	Sample	G749.5368
6	Sample	G750.5369
7		
8		
9		
10		

	Description	Lab ID
11		
12		
13		
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16		
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20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No: and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS	93851 .250ml			
Spike	93851 .100ml			
		937		

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-438-101

DATE START: NOVEMBER 30, 1993

PREPARED BY: J.L. SLIPPERN 12/16/93

DATE COMPLETE: DECEMBER 16, 1993

	UNITS:	uCi/mL										
SPL NAME	SPL ID	ANALYTE	RESULT #1	RESULT #2	AVERAGE	RPD%	%REC #1	%REC #2	DET LIM #1	DET LIM #2	% CT ER #1	% CT ER #2
STD 93B51	G745	Tc99	3.74				103.1		3.30E-05		1.5	
BLANK	G476	Tc99	8.78E-06				71.0		7.95E-06		5.7	
A-8	G747	Tc99	<1.06E-05				52.8		1.06E-05		5.9	
B-8	G748	Tc99	3.73E-04				89.6		8.11E-06		2.2	
C-8	G749	Tc99	4.12E-04				73.5		7.87E-06		2.1	
D-8	G750	Tc99	6.08E-04				58.9		8.20E-06		1.8	

NARRATIVE: [X] NO SPECIAL PROBLEMS/METHOD VARIATIONS IN THIS BATCH

LIST SPECIFIC PROBLEMS/VARIATIONS FOR THIS BATCH:

The results for the standard are in uCi/L.

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

1-2

Serial No	Sample Point	Date	Time Issued	Priority
G 745.-5584	102 90 DAY	11-23-93	13:43	

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	% RECOVERY	VOGEL	

Sample Size	Customer ID
?.250ml + .100ml spike #76B51	STD

Remarks Calculations Results

EDP 6863 TC99

STD# 93051 RESULT 3.74

STD VAL 3,627 %REC 103,1%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
11/30/93	1415	

54-6800-061 (R 10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

			STANDARD
Serial No.	Spike (Tracer) Book Number		76B51
G745-5584	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	0.25
2266	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	947.0219
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4670.286
R MEYERS	Background cpm	(BKG cpm)	53.95
Date	Background Time Counted in Minutes	(BKG time)	20
11/30/93	Instrument Fractional Efficiency	(EFF)	0.9318
	Detection Limit	(Ld)	8.36
	Critical Level	(Lc)	3.83
	Tc-99 Concentration in µCi/L =		3.7355E+00

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	3.74E+00	
Tc-99 Concentration in µCi/mL	=	3.74E-03	3.30E-05 µCi/mL
Spike (Tracer) Recovery	=	68.5%	

Data Entry by:	Date:	07-Dec-93
Approved by:	Date:	12/16/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

3-4

Serial No	Sample Point	Date	Time Issued	Priority
G 746.-5684	102 90 DAY -	11-30-93	12:51	

Determination	Method/Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	µCi/ML	VOGEL	

Sample Size	Customer ID
? 1m1 + 100m1 Spike # 76B51	BLK

Remarks, Calculations, Results

REAGENT BLANK

COUNT AS uCI/L

8.78E-6 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
R Meyers				
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
11/30/93	1415	

54 6800-061 R 10 83

Tc-99: LA-438-101 (D-1) LIQUIDS

			BLANK
Serial No.	Spike (Tracer) Book Number		76B51
G746-5684	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	1
2266	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	9.223468
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	3865.861
R MEYERS	Background cpm	(BKG cpm)	53.95
Date	Background Time Counted in Minutes	(BKG time)	20
11/30/93	Instrument Fractional Efficiency	(EFF)	0.9324
	Detection Limit	(Ld)	8.35
	Critical Level	(Lc)	3.83
	Tc-99 Concentration in µCi/L =		8.7810E-03

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	8.78E-03	
Tc-99 Concentration in µCi/mL	=	8.78E-06	7.95E-06 µCi/mL
Spike (Tracer) Recovery	=	71.0%	

Data Entry by:	Date:	07-Dec-93
Approved by:	Date:	12/16/93

Form 1 Rev. 2.0

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

5-6

Serial No	Sample Point	Date	Time Issued	Priority
G 747 -5784	102 90 DAY	11-22-93	12:52	36

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	VOGEL	0

Sample Size	Customer ID
1ml + .100ml spike #76B51	A-8

Remarks Calculations Results

COUNT AS uCi/L

< 1.06E-5 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
RD Meyers	[signature]	[signature]		
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
11/30/93	1415	[signature]

54-6800-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

			SAMPLE
Serial No.	Spike (Tracer) Book Number		76B51
G747-5784	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	1
2266	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	4.846776
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	2875.388
R MEYERS	Background cpm	(BKG cpm)	53.95
Date	Background Time Counted in Minutes	(BKG time)	20
11/30/93	Instrument Fractional Efficiency	(EFF)	0.9388
	Detection Limit	(Ld)	8.30
	Critical Level	(Lc)	3.83
	Tc-99 Concentration in µCi/L =	<	1.0613E-02

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).

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			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	< 1.06E-02	
Tc-99 Concentration in µCi/mL	=	< 1.06E-05	1.06E-05 µCi/mL
Spike (Tracer) Recovery	=	52.8%	

Data Entry by:	[signature]	Date:	07-Dec-93
Approved by:	Jennifer L. Seppen	Date:	12/16/93

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PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

7-8

Serial No	Sample Point	Date	Time Issued	Priority
G 748.-5784	102 90 DAY	11-22-93	13:54	36

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	VOGEL	0

Sample Size	Customer ID
2 ml + 100ml Spike #76B51	D-8

Remarks Calculations Results

COUNT AS uCI/L

3.73E-4 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
RMeyers		DHMilligan		
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
11/30/93	1415	

54-6800-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.			SAMPLE
G748-5784	Spike (Tracer) Book Number		76B51
	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	1
2266	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	384.3827
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4167.239
R MEYERS	Background cpm	(BKG cpm)	53.95
Date	Background Time Counted in Minutes	(BKG time)	20
11/30/93	Instrument Fractional Efficiency	(EFF)	0.9324
	Detection Limit	(Ld)	8.35
	Critical Level	(Lc)	3.83
	Tc-99 Concentration in µCi/L =		3.7308E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	3.73E-01	
Tc-99 Concentration in µCi/mL	=	3.73E-04	8.11E-06 µCi/mL
Spike (Tracer) Recovery	=	69.6%	

Data Entry by:		Date: 07-Dec-93
Approved by:		Date: 12/16/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

9-10

WHC-SD-WM-DP-054 REV O

Serial No	Sample Point	Date	Time Issued	Priority
G 749.-5784	102 30 DAY	11-22-93	12:55	26

Determination	Method Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	uCi/ML	VOGEL	0

Sample Size	Customer ID
2 1ml + 100ml spike #76851	C-8

Remarks, Calculations, Results

COUNT AS uCi/L

4.12E-4 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
11/30/93	1415	

54-6800-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

			SAMPLE
Serial No.	Spike (Tracer) Book Number		76851
G749-5784	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	1
2266	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	448.4607
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4440.337
R MEYERS	Background cpm	(BKG cpm)	53.95
Date	Background Time Counted in Minutes	(BKG time)	20
11/30/93	Instrument Fractional Efficiency	(EFF)	0.9346
	Detection Limit	(Ld)	8.33
	Critical Level	(Lc)	3.83
	Tc-99 Concentration in µCi/L =		4.1248E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	4.12E-01	
Tc-99 Concentration in µCi/mL	=	4.12E-04	7.67E-06 µCi/mL
Spike (Tracer) Recovery	=	73.5%	

Data Entry by:	Date:	07-Dec-93
Approved by:	Date:	12/16/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

11-12

Serial No	Sample Point	Date	Time Issued	Priority
G 750,-5784	102 90 DAY	11-22-93	12:55	06

Determination	Method-Standard	Result Units	Charge Code	Reruns
Tc99	LA-438-101	µCi/ML	VOGEL	0

Sample Size: 2 [ml] +.100ml spike #76B51 — Customer ID: D-8

Remarks Calculations Results

COUNT AS µCi/L

6.08E-4 µCi/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
R Meyers		D A Williams		
Hrs	Hrs	Hrs	Hrs	Hrs

Date: 11/30/93 — Time Completed: 1415 — Lab Unit Mgr: J J Luppens

54-6800-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

Serial No.			SAMPLE
G750-5784	Spike (Tracer) Book Number		76B51
Batch ID	Activity for 100µl of Spike Added in dpm	(dm3)	8151
2266	Volume of Sample in mL	(SS)	1
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	dpm of Sample from Liquid Scintillation Counter	(dm1)	619.8493
R MEYERS	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4362.644
Date	Background cpm	(BKG cpm)	53.95
11/30/93	Background Time Counted in Minutes	(BKG time)	20
	Instrument Fractional Efficiency	(EFF)	0.9324
	Detection Limit	(Ld)	8.35
	Critical Level	(Lc)	3.83
	Tc-99 Concentration in µCi/L =		6.0806E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
Tc-99 µCi/mL = µCi/L / (1000mL/L)
Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

			DETECTION LEVEL
Tc-99 Concentration in µCi/L	=	6.08E-01	
Tc-99 Concentration in µCi/mL	=	6.08E-04	8.20E-06 µCi/mL
Spike (Tracer) Recovery	=	68.9%	

Data Entry by: [signature] Date: 07-Dec-93

Approved by: [signature] Date: 12/16/93

Form 1 Rev. 2.0

USER: 5 ID:TC 99 PRESET TIME: 20.00 TUE 30 NOV 1993 21:08
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:Y QCF:N RCM:Y 2 PHASE MONITOR:N
RCM-TIME: 0.10 INT:999.95
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

SINGLE LABEL DPM SET UP ON 20 DEC 1991 13:1[illegible]

UNKNOWN ID:TC 99 UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR ISO1:Q 1.00000
UNKNOWN UNITS ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N BACKGROUND QUENCH CURVES:Y
STANDARD ID:131B28-A 1-10 QUENCH LIMITS LOW:73.67 HIGH:207.7
HALF LIFE(DAYS) ISO1:N
STANDARD DPM ISO1:0.00000000

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	ERR
B1	**- 1	1	53.95	6.09	20.00	20.94	148.0	[illegible]	

BACKGROUND QUENCH CURVES: CONSTANT

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CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: 53.95000 B:0.00000000 C:0.00000000 D:0.0000000000

BACKGROUND QUENCH CURVE CORRELATION TABLE

BKG	H#	MEASURED CPM.	CALCULATED CPM.	PERCENT DIFF.	FLAG
1	148.0	53.95	53.95	0.00	

BACKGROUND QUENCH LIMITS LOW:0.000 HIGH:1000.
TOTAL QUENCH LIMITS LOW:73.67 HIGH:207.7

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	ERR
1	**- 3	1	936.35	1.46	20.00	42.17	162.0	0.60	
	ISO1 %EFF CH1:93.18						ISO1 DPM	:947.0219	
2	**- 4	1	4405.55	0.67	20.00	63.32	162.0	0.14	
	ISO1 %EFF CH1:93.18						ISO1 DPM	:4670.286	
3	**- 5	1	62.55	5.65	20.00	84.40	161.0	2.94	
	ISO1 %EFF CH1:93.24						ISO1 DPM	:9.223468	
4	**- 6	1	3664.10	0.74	20.00	105.54	159.0	0.16	
	ISO1 %EFF CH1:93.39						ISO1 DPM	:3865.861	

AM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	ERR
5	**- 7	1	58.50	5.85	20.00	126.61	153.0	4.29	
	ISO1	%EFF	CH1:93.88				ISO1 DPM	:4.846776	
6	**- 8	1	2761.55	0.85	20.00	147.70	149.0	0.21	
	ISO1	%EFF	CH1:94.16				ISO1 DPM	:2875.388	
7	**- 9	1	412.35	2.20	20.00	168.80	161.0	1.60	
	ISO1	%EFF	CH1:93.24				ISO1 DPM	:384.3827	
8	**-10	1	3939.50	0.71	20.00	189.96	161.0	0.17	
	ISO1	%EFF	CH1:93.24				ISO1 DPM	:4167.239	
9	**-11	1	473.10	2.06	20.00	211.06	158.0	1.27	
	ISO1	%EFF	CH1:93.46				ISO1 DPM	:448.4607	
10	**-12	1	4197.25	0.69	20.00	232.15	160.0	0.12	
	ISO1	%EFF	CH1:93.31				ISO1 DPM	:4440.337	
11	**- 1	1	631.90	1.78	20.00	253.31	161.0	1.13	
	ISO1	%EFF	CH1:93.24				ISO1 DPM	:619.8493	
12	**- 2	1	4118.90	0.70	20.00	274.46	162.0	0.18	
	ISO1	%EFF	CH1:93.18				ISO1 DPM	:4362.644	

90-DAY - OTHER ANALYSES

#1896

WESTINGHOUSE HANFORD COMPANY

222-S LABORATORY WHC-SD-WM-DP-054 REV 0

ANALYTICAL BATCH

Lab Segment Serial No.	Customer ID
G-698, G-699, G-700, G-701	A-9, B-9, C-9, D-9 H-9 H-10-27-93 102-90-DAY
Analysis: TOC	Sample Prep: Direct

Instrument: AL-10723	Procedure/ Rev: LA-344-105/ B-2 RSD 12-1-93
Technologist: RG Acker	Date: 10/12/93
Starting Time: 13:00	Temperature 25°C
Ending Time: 15:00	Chemist: Rob Schroeder

Comments: _____

	Description	Lab ID
1	STD	G-698-5526
2	BLK	G-697-5626
3	Sample	G-698-5726
4	Sample	G-699-5726
5	Sample	G-700-5726
6	Sample	G-701-5726
7		
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9		
10		

	Description	Lab ID
11		
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19		
20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS	10N12A/.200ml			
		948		

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ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA 344-105/B-2 ANALYTE: ~~NH4~~ TOC ANALYSIS START DATE: 10-12-93

PREPARED BY: Rob Schroeder DATE PREPARED: 10-20-93

PROJECT: 102 40 DAY UNITS: mg/mL SAMPLE PREP: (Direct) / Digest wt.=

SPL PT.	SERIAL No.	RESULT #1	RESULT #2	DIFF.	AVERAGE	RPD%	%REC	DET LIM
STD	G696	2.84 mg/mL					95	
BLK	G697	<5.50 mgC/mL						5.5 ug/mL
A-9	G698	<5.50 mgC/mL						5.5 ug/mL
B-9	G699	<5.50 mgC/mL						
C-9	G700	7.7 mgC/mL						
D-9	G701	1.1 E+1 mgC/mL						

X NO SPECIAL PROBLEMS / METHOD VARIATIONS IN HIS BATCH

NARRATIVE-LIST SPECIFIC PROBLEMS / VARIATIONS FOR THIS BATCH:

Robert W. Schroeder
10-20-93

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 696.-5526	102 90 DAY	9-23-93	14:46	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	% RECOVERY	D44B3	0

Sample Size	Customer ID
? .200-2ml-.200	STD

Remarks, Calculations, Results

S356 CO3TOC

STD#/ON/2A RESULT 2.84

STD VAL %REC 95%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/4/93	13:57	

10/19

RW Schroeder 10-25-93

54-6800-061 (R 10 83)

Serial No	Sample Point	Date	Time Issued	Priority
G 697.-5626	102 90 DAY	9-23-93	14:59	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
? .200ml H2SO4	BLK

Remarks, Calculations, Results

REAGENT BLANK

$$\frac{<5.50E^{-3}\ g/l \times 1{,}000{,}000}{1000} = <5.50\ ug/ML$$

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/12/93	19:07	

10/19

RW Schroeder 10-25-93

54-6800-061 (R 10 83)

BEST AVAILABLE COPY

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 698.-5726	102 90 DAY	9-23-93	15: 6	26

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
? 2ml-.200=.200	A-9

Remarks, Calculations, Results

$$\frac{< 5.50E^{-3}\ g/l \times 1{,}000{,}000}{1000} = < 5.50\ ug/ml$$

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/12/93	14:16	

RW Schroeder 10-25-93

54-5800-061 (R-10-83)

Serial No	Sample Point	Date	Time Issued	Priority
G 699.-5726	102 90 DAY	9-23-93	15: 6	26

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
? 2ml-.200-.200	B-9

Remarks, Calculations, Results

$$\frac{< 5.50E^{-3}\ g/l \times 1{,}000{,}000}{1000} = < 5.50\ ug/ml$$

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/12/93	14:28	

RW Schroeder 10-25-93

54-5800-061 (R-10-83)

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 700.-5726	102 90 DAY	9-23-93	15: 6	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
? 2ml - .200 - .200	C-9

Remarks, Calculations, Results

$$\frac{7.7E-3\ g/l \times 1{,}000{,}000}{1000} = 7.7\ ug/mL$$

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/12/93	14:36	

RW Schroeder 10-25-93

Serial No	Sample Point	Date	Time Issued	Priority
G 701.-5726	102 90 DAY	9-23-93	15: 7	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
? 2ml - .200 - .200	D-9

Remarks, Calculations, Results

$$\frac{1.1E-2\ g/l \times 1{,}000{,}000}{1{,}000} = 1.1E+1\ ug/mL$$

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr
10/12/93	14:45	

RW Schroeder 10-25-95

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TIC/TOC REV 2.0

Sample: STD Date: 10/12/93 Time: 13:57:30

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = BLK
Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.70	0.00
2	1.00	30.20	97.68
3	1.50	45.50	33.63
4	2.00	50.50	9.90
5	2.50	52.50	3.81
6	3.00	53.60	2.05
7	3.50	54.00	0.74
8	4.00	54.50	0.92
9	4.50	54.90	0.73
10	5.00	55.50	1.08
11	5.50	55.70	0.36
12	6.00	56.10	0.71
13	6.50	56.40	0.53
14	7.00	56.70	0.53

BLANK VALUE = 5.1 micrograms carbon
BLANK FACTOR = 5.1 / 7.003723 = +7.3E-01 ug/min Carbon

SAMPLE RESULTS:
(56.7 - 5.100089)(11)/(200) = +2.84E+00 g/L Carbon
(56.7 - 5.100089)(11)/(200)(12) = +2.36E-01 Molar Carbon

Sample Run By: RG ACHEN 10/12/93

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 1423 TO 1454.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BLK Date: 10/12/93 Time: 13:41:15

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BLK
Blank Value = N/A

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.20	66.67
3	1.50	1.60	25.00
4	2.00	2.00	20.00
5	2.50	2.30	13.04
6	3.00	2.70	14.81
7	3.50	3.00	10.00
8	4.00	3.30	9.09
9	4.50	3.60	8.33
10	5.00	3.90	7.69
11	5.50	4.20	7.14
12	6.00	4.70	10.64
13	6.50	4.90	4.08
14	7.00	5.10	3.92

BLANK VALUE = 5.1 micrograms carbon
BLANK FACTOR = 5.1 / 7.003723 = +7.3E-01 ug/min Carbon

Sample Run By: RG ACHEN 10/12/93

TOC- TOTAL ORGANIC CARBON ANALYSIS METHOD
TECTOC REV 2.0

WHC-SD-WM-DP-054 REV O

Sample: G 697-5626 Date: 10/12/93 Time: 14:07:30

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = BLK
Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.90	88.89
3	1.51	1.20	25.00
4	2.01	1.50	20.00
5	2.51	1.90	21.05
6	3.01	2.30	17.39
7	3.51	2.50	8.00
8	4.01	2.90	13.79
9	4.50	3.20	9.37
10	5.00	3.50	8.57
11	5.50	3.80	7.89
12	6.00	4.20	9.52
13	6.51	4.40	4.55
14	7.00	4.70	6.38

BEST AVAILABLE COPY

BLANK VALUE = 5.1 micrograms carbon
BLANK FACTOR = 5.1 / 7.003723 = +7.3E-01 ug/min Carbon

SAMPLE RESULTS: cac 10/13/93
(4.7 - 5.100844)~~(11)~~ 1.1 /(200) = < 5.50 E-3 g/L Carbon
cac 10/13/93
(4.7 - 5.100844)(11)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: RG ACHEN 10/12/93

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

WHC-SD-WM-DP-054 REV O

Sample: G 698-5726 Date: 10/12/93 Time: 14:16:11

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.20	66.67
3	1.51	1.80	33.33
4	2.01	2.00	10.00
5	2.51	2.40	16.67
6	3.01	2.70	11.11
7	3.51	3.10	12.90
8	4.01	3.30	6.06
9	4.50	3.60	8.33
10	5.01	3.90	7.69
11	5.51	4.30	9.30
12	6.01	4.70	8.51
13	6.51	5.00	6.00
14	7.00	5.20	3.85

BEST AVAILABLE COPY

BLANK VALUE = 5.1 micrograms carbon
BLANK FACTOR = 5.1 / 7.003723 = 47.3E-01 ug/min Carbon

SAMPLE RESULTS:
(5.2 - 5.1008)(1.1)/(200) = < 5.50 E-3 g/L Carbon
(5.2 - 5.1008)(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

LAC 10/13/93

Sample Run By: RG ACHEN 10/12/93

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

WHC-SD-WM-DP-054 REV O

Sample: G 699-5726 Date: 10/12/93 Time: 14:28:32

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .7231841 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	1.40	78.57
3	1.51	1.70	17.65
4	2.01	2.10	19.05
5	2.51	2.60	19.23
6	3.01	2.90	10.34
7	3.51	3.00	3.33
8	4.01	3.30	9.09
9	4.51	3.70	10.81
10	5.01	4.10	9.76
11	5.51	4.30	4.65
12	6.01	4.60	6.52
13	6.51	5.00	8.00
14	7.00	5.20	3.85

BEST AVAILABLE COPY

BLANK VALUE = 5.1 micrograms carbon
BLANK FACTOR = 5.1 / 7.003723 = +7.3E-01 ug/min Carbon

SAMPLE RESULTS:
(5.2 - 5.100844)(1.1)/(200) = ~~5.00~~ < 5.50E-3 rac 10/13/93 E-3 g/L Carbon
(5.2 - 5.100844)(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: RG ACHEN 10/12/93

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

WHC-SD-WM-DP-054 REV O

Sample: G 700-5726 Date: 10/12/93 Time: 14:36:39

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.90	78.95
3	1.51	2.50	24.00
4	2.01	3.10	19.35
5	2.51	3.50	11.43
6	3.01	3.70	5.41
7	3.51	4.10	9.76
8	4.00	4.50	8.89
9	4.50	4.80	6.25
10	5.00	5.30	9.43
11	5.50	5.70	7.02
12	6.00	5.70	0.00
13	6.50	6.00	5.00
14	7.00	6.50	7.69

BLANK VALUE = 5.1 micrograms carbon
BLANK FACTOR = 5.1 / 7.003723 = +7.3E-01 ug/min Carbon

SAMPLE RESULTS:
(6.5 - 5.100089)(1.1)/(200) = +7.7E-03 g/L Carbon
(6.5 - 5.100089)(1.1)/(200)(12) = +6.4E-04 Molar Carbon

Sample Run By: RG ACHEN 10/12/93

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 701-5726 Date: 10/12/93 Time: 14:44:30

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	2.30	86.96
3	1.51	3.10	25.81
4	2.01	3.60	13.89
5	2.51	4.00	10.00
6	3.01	4.40	9.09
7	3.51	4.60	4.35
8	4.01	5.00	8.00
9	4.50	5.40	7.41
10	5.00	5.70	5.26
11	5.50	6.00	5.00
12	6.00	6.40	6.25
13	6.50	6.80	5.88
14	7.00	7.10	4.23

BLANK VALUE = 5.1 micrograms carbon
BLANK FACTOR = 5.1 / 7.003723 = +7.3E-01 ug/min Carbon

SAMPLE RESULTS:
(7.1 - 5.100222)(1.1)/(200) = +1.1E-02 g/L Carbon
(7.1 - 5.100222)(1.1)/(200)(12) = +9.2E-04 Molar Carbon

Sample Run By: RG ACHEN 10/12/93

QA 8

WESTINGHOUSE HANFORD COMPANY Batch 1958

222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.	Customer ID:
G-720, G-721, G-722, G-723	A-10, B-10, C-10, 103-90-DA4 D-10
Analysis: TOC	Sample Prep: Direct

Instrument: AL-1023	Procedure/ Rev: LA-344-105/ B-2
Technologist: RG Achen	Date: 10/20/93
Starting Time: 13:00	Temperature 25°C
Ending Time: 14:05	Chemist: Rob Schroeder

Comments:

	Description	Lab ID
1	STD	G-718-5926
2	BLK	G-719-5926
3	Sample @ 10-27-93	G-720-5926
4	Sample G721	~~G727~~ -5926
5	Sample	G722-5926
6	Sample	G-723-5926
7		
8		
9		
10		

	Description	Lab ID
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LCS	10N12-A/ .200ml			

960

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA 344-105/B-2 ANALYTE: TOC ANALYSIS START DATE: 10-20-93

PREPARED BY: Rob Schroeder DATE PREPARED: 10-21-93

PROJECT: ~~TOC~~ RWS 10-21-93 TOC 102 5day UNITS: mg/mL SAMPLE PREP: (Direct) Digest wt.=

SPL PT.	SERIAL No.	RESULT #1	RESULT #2	DIFF.	AVERAGE	RPD%	%REC	DET LIM
STD	G718	2.88 mg/L					96.0	
BLANK	G719	~~2.25 mg/L~~	<5.50 RWS 10-21-93					5.50 mg/mL
A-10	G720	<5.50 mg/mL						
B-10	G721	<5.50 mg/mL						
C-10	G722	7.15 EO mg/mL						
D-10	G723	8.80 EO mg/mL						

X NO SPECIAL PROBLEMS / METHOD VARIATIONS IN HIS BATCH

NARRATIVE-LIST SPECIFIC PROBLEMS / VARIATIONS FOR THIS BATCH:

Robert W. Schroeder

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No.	Sample Point	Date	Time Issued	Priority
G 718.-5526	102 90 DAY	10-15-93	9:43	06

Determination	Method/Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	% RECOVERY	D44B3	0

Sample Size	Customer ID
?.200-2ml-.200	STD

Remarks, Calculations, Results

S356 CO3TOC

STD# 10NQA RESULT 2.88 G/L

STD VAL 3.00 G/L REC 96.00%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst 5
	Hrs	Hrs CA Clark	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr 10-21-93	
10/20/93	13:05	RW Schroeder	10/21

54-6800-061 (R 10 83)

Serial No.	Sample Point	Date	Time Issued	Priority
G 719.-5626	102 90 DAY	10-15-93	9:46	06

Determination	Method/Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
?.200 - Direct	BLK

Remarks, Calculations, Results

REAGENT BLANK

~~<5.50 $\times 10^{-3}$ g/L C $\times$ 1,000,000 µg / 1,000 mL~~ = ~~<5.50 µg/mL C~~ RWS 10/21/93

~~4.50 µg / 0.200 mL = 2.25 $\times 10^{1}$ µg/mL C~~ RWS 10-21-93

<5.50 µg/mL C

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst 5
	Hrs	Hrs CA Clark	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr 10-21-93	
10/20/93	13:17	RW Schroeder	10/25

54-6800-061 (R 10 83)

BEST AVAILABLE COPY

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 720.-5726	102 90 DAY	10-15-93	9:47	26

Determination	Method-Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
? 2ml-200-200	A-10

Remarks, Calculations, Results

$< 5.50 \times 10^{-3}$ gC x $\frac{1000000}{1000}$ =

< 5.50 mgC/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
		CA Clark		
Date	Time Completed	Lab Unit Mgr 10-21-93		
10/20/93	13:36	RW Schroeder		

54-6800-06 (R/10-83)

Serial No	Sample Point	Date	Time Issued	Priority
G 721.-5726	102 90 DAY	10-15-93	9:50	26

Determination	Method-Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
? 2ml-200-.200	B-10

Remarks, Calculations, Results

< 5.50 gC/L $\times 10^{-3}$ x $\frac{1000000}{1000}$ = < 5.50 mgC/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
		CA Clark		
Date	Time Completed	Lab Unit Mgr 10-21-93		
10/20/93	13:44	RW Schroeder		

54-6800-06 (A-10-83)

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 722.-5726	102 90 DAY	10-15-93	9:50	26

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
?2ml-.200-.200	C-10

Remarks, Calculations, Results

7.15×10^{-5} gC/mL $\times \frac{1,000,000}{1000} =$ 7.15 mgC/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
		CA Clark		

Date	Time Completed	Lab Unit Mgr	
10/20/93	13:56	RW Schroeder 10-21-93	10/25

54-6800-061 (R-10-83)

Serial No	Sample Point	Date	Time Issued	Priority
G 723.-5726	102 90 DAY	10-15-93	9:51	26

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0

Sample Size	Customer ID
?2ml-.200-.200	D-10

Remarks, Calculations, Results

8.80×10^{-3} gC/L $\times \frac{1000000}{1000} =$ 8.80 mgC/mL

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
		CA Clark		

Date	Time Completed	Lab Unit Mgr	
10/20/93	14:05	RW Schroeder 10-21-93	10/25

54-6800-061 (R-10-83)

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD Date: 10/20/93 Time: 13:04:56

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = BLK
Blank Value = .642493 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.50	0.00
2	1.01	28.00	98.21
3	1.51	45.70	38.73
4	2.01	51.10	10.57
5	2.51	53.00	3.58
6	3.01	54.10	2.03
7	3.51	54.50	0.73
8	4.01	54.80	0.55
9	4.51	55.30	0.90
10	5.01	55.60	0.54
11	5.51	56.00	0.71
12	6.01	56.30	0.53
13	6.51	56.50	0.35
14	7.01	56.80	0.53

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 965 TO ____.

BLANK VALUE = 4.5 micrograms carbon
BLANK FACTOR = 4.5 / 7.003967 = +6.4E-01 ug/min Carbon

SAMPLE RESULTS:
(56.8 - 4.501098)(11)/(200) = +2.88E+00 g/L Carbon
(56.8 - 4.501098)(11)/(200)(12) = +2.40E-01 Molar Carbon

Sample Run By: Rodney Achen 10/20/93
RG ACHEN

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BLK Date: 10/20/93 Time: 12:56:50

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BLK
Blank Value = N/A

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	0.90	66.67
3	1.51	1.60	43.75
4	2.00	1.80	11.11
5	2.50	2.10	14.29
6	3.00	2.50	16.00
7	3.51	2.70	7.41
8	4.01	2.90	6.90
9	4.50	3.10	6.45
10	5.00	3.50	11.43
11	5.50	3.70	5.41
12	6.00	4.00	7.50
13	6.50	4.50	11.11
14	7.00	4.50	0.00

BLANK VALUE = 4.5 micrograms carbon
BLANK FACTOR = 4.5 / 7.003967 = +6.4E-01 ug/min Carbon

Sample Run By: RG ACHEN 10/20/93

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 720-5726 Date: 10/20/93 Time: 13:36:25

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .642493 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.20	0.00
2	1.01	0.60	66.67
3	1.50	1.00	40.00
4	2.00	1.40	28.57
5	2.50	1.80	22.22
6	3.00	2.00	10.00
7	3.50	2.40	16.67
8	4.00	2.70	11.11
9	4.50	2.80	3.57
10	5.00	3.10	9.68
11	5.50	3.30	6.06
12	6.00	3.50	5.71
13	6.50	3.80	7.89
14	7.00	4.10	7.32

BLANK VALUE = 4.5 micrograms carbon
BLANK FACTOR = 4.5 / 7.003967 = +6.4E-01 ug/min Carbon

SAMPLE RESULTS:
(4.1 - 4.499922)(1.1)/(200) = < ~~5.00~~ 5.50 E-3 g/L Carbon
(4.1 - 4.499922)(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

LL 10/21/93

Sample Run By: RG ACHEN 10/20/93

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 721-5726 Date: 10/20/93 Time: 13:44:22

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .642493 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.50	80.00
3	1.50	1.60	68.75
4	2.00	2.00	20.00
5	2.50	2.50	20.00
6	3.00	2.80	10.71
7	3.50	3.00	6.67
8	4.00	3.40	11.76
9	4.50	3.60	5.56
10	5.00	4.00	10.00
11	5.50	4.10	2.44
12	6.00	4.30	4.65
13	6.50	4.80	10.42
14	7.00	5.00	4.00

BLANK VALUE = 4.5 micrograms carbon
BLANK FACTOR = 4.5 / 7.003967 = +6.4E-01 ug/min Carbon

SAMPLE RESULTS:
(5 - 4.499372)(1.1)/(200) = < 5.50 ~~5.00~~ E-3 g/L Carbon
(5 - 4.499372)(1.1)/(200)(12) = < 4.17 E-4 Molar Carbon

JL 10/21/93

Sample Run By: RG ACHEN 10/20/93

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 7Z2-5726 Date: 10/20/93 Time: 13:56:27

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .642493 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.20	0.00
2	1.01	1.70	88.24
3	1.51	2.50	32.00
4	2.00	2.90	13.79
5	2.51	3.00	3.33
6	3.01	3.40	11.76
7	3.51	3.70	8.11
8	4.01	4.00	7.50
9	4.50	4.30	6.98
10	5.00	4.60	6.52
11	5.50	4.80	4.17
12	6.00	5.10	5.88
13	6.50	5.40	5.56
14	7.00	5.80	6.90

BLANK VALUE = 4.5 micrograms carbon
BLANK FACTOR = 4.5 / 7.003967 = +6.4E-01 ug/min Carbon

SAMPLE RESULTS:
(5.8 - 4.500588)(1.1)/(200) = +7.1E-03 g/L Carbon
(5.8 - 4.500588)(1.1)/(200)(12) = +6.0E-04 Molar Carbon

Sample Run By: RG ACHEN 10/20/93.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 723-5726 Date: 10/20/93 Time: 14:05:27

Sample Size = 200 ul
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .642493 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.60	0.00
2	1.01	2.00	70.00
3	1.51	2.90	31.03
4	2.01	3.10	6.45
5	2.51	3.50	11.43
6	3.01	3.80	7.89
7	3.51	4.10	7.32
8	4.01	4.40	6.82
9	4.50	4.70	6.38
10	5.00	4.90	4.08
11	5.50	5.30	7.55
12	6.00	5.50	3.64
13	6.50	5.80	5.17
14	7.00	6.10	4.92

BLANK VALUE = 4.5 micrograms carbon
BLANK FACTOR = 4.5 / 7.003967 = +6.4E-01 ug/min Carbon

SAMPLE RESULTS:
(6.1 - 4.499412)(1.1)/(200) = +8.8E-03 g/L Carbon
(6.1 - 4.499412)(1.1)/(200)(12) = +7.3E-04 Molar Carbon

Sample Run By: RG ACHEN 10/20/93

WESTINGHOUSE HANFORD COMPANY *Batch 2262*

222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No. 6-747, 748, 749, 750	Customer ID: A-S C-S B-S D-S
Analysis: TOC	Sample Prep: Direct

Instrument: WC16130	Procedure/ Rev: LA-344-105/B-2
Technologist: Tanica Bates	Date: 12-8-93
Starting Time: 11:23	Temperature 23°C
Ending Time: 1300	Chemist: R Schroeder

Comments:

	Description	Lab ID
1	LMCS	6-745-5526
2	Blk	6-746-5626
3	Sample	6-747-5726
4	Sample	6-748-5726
5	Sample	6-749-5726
6	Sample	6-750-5726
7		
8		
9		
10		

	Description	Lab ID
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
TOC	10N12-B .200mL			
TOC spike	N/A			
		971		

Tanica Bates 12-8-93

ANALYTICAL BATCH SUMMARY SHEET

METHOD: LA-344-105/B-2 ANALYTE: TOC ANALYSIS START DATE: 12-8-13

PREPARED BY: Rob Schroeder DATE PREPARED: 12-10-93

PROJECT: 102 AF 90 day RWS 12-10-13 UNITS: mgC/mL SAMPLE PREP: (Direct) Digest wt.=

SPL PT.	SERIAL No.	RESULT #1	RESULT #2	DIFF.	AVERAGE	RPD%	%REC	DET LIM
STD	G745	2.82						5.50
BLK	G746	<5.50						
A-8	G747	<5.50						
B-8	G748	~~7.0~~ 7.1	RWS 12-10-13					
C-8	G749	~~9.3~~ 9.3	RWS 12-10-13					
D-8	G750	1.5 E1						

☐ NO SPECIAL PROBLEMS / METHOD VARIATIONS IN HIS BATCH

NARRATIVE-LIST SPECIFIC PROBLEMS / VARIATIONS FOR THIS BATCH:

Standard result reported in gC/L, all other results reported in mgC/mL.

Robert W Schroeder
12-10-93

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 745.-5526	102 90 DAY	11-22-93	12:48	

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	% RECOVERY	VOGEL	

Sample Size	Customer ID
? , 200 - 2 ml - . 200 ml	STD

Remarks, Calculations, Results

S356 C03TOC

STD# 10 N12-B RESULT 2.82

STD VAL 3.00 %REC 94.60

Dania Bates

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs E. Castleberry	Hrs

Date	Time Completed	Lab Unit Mgr 12-10-93	
12-8-93	1300	RW Schroeder	E. Castleberry

54-6800-061 (R-10-83)

Serial No	Sample Point	Date	Time Issued	Priority
G 746.-5626	102 90 DAY	11-22-93	12:51	

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	VOGEL	

Sample Size	Customer ID
? ~~200 - 2 ml - 20~~ T-B. 12-8-93 2ML - . 200 ml - 200 ml	BLK

Remarks, Calculations, Results

REAGENT BLANK

< 5.50 ug/mL

Dania Bates

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs E. Castleberry	Hrs

Date	Time Completed	Lab Unit Mgr 12-10-93	
12-8-93	1300	RW Schroeder	E. Castleberry

54-6800-061 (R-10-83)

BEST AVAILABLE COPY

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 747.-5726	102 90 DAY	11-22-93	12:52	26

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	VOGEL	0

Sample Size	Customer ID
? 2ml - .200 - .200 ml	A-8

Remarks, Calculations, Results

<5.50
<5.00E-3 gC/L · 1000000 ug/g · 1L/1000 mL = <5.00 ugC/mL

RWS 12-10-93

<5.50

RWS 12-10-93

Daniel Bates

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
			E. Cantrell	

Date	Time Completed	Lab Unit Mgr 12-10-93	
12-8-93	1300	RW Schroeder	E. Cantrell

54-6800-061 (R-10-83)

Serial No	Sample Point	Date	Time Issued	Priority
G 748.-5726	102 90 DAY	11-22-93	12:54	26

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	VOGEL	0

Sample Size	Customer ID
? 2ml - .200 → .200 ml	B-8

Remarks, Calculations, Results

RWS 12-10-93

~~7.1E-3~~ gC/L · 1000000 ug/g · 1L/1000mL = 7.10 ugC/mL

7.1 E-3

RWS 12-10-93

7.1

Daniel Bates

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
			E. Cantrell	

Date	Time Completed	Lab Unit Mgr 12-10-93	
12-8-93	1300	RW Schroeder	E. Cantrell

54-6800-061 (R-10-83)

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 749.-5726	102 90 DAY	11-22-93	12:55	36

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	VOGEL	0

Sample Size	Customer ID
? 2 ml - .200 → .200 ml	C-8

Remarks, Calculations, Results

~~9.3E-3~~ 9.3 gC/L • 1000000 ug/g • 1L/1000mL = ~~9.30~~ 9.3 mgC/mL

RWS 12-10-93 RWS 12-10-93

Daniel Bates

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs E. Cartens	Hrs

Date	Time Completed	Lab Unit Mgr 12-10-93	
12-8-93	1300	RW Schroeder	E. Cartens

54-6800-061 (R-10-83)

Serial No	Sample Point	Date	Time Issued	Priority
G 750.-5726	102 90 DAY	11-22-93	12:55	36

Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	VOGEL	0

Sample Size	Customer ID
? 2 mL - .200 → .200 mL	D-8

Remarks, Calculations, Results

1.5E-2 gC/L • 1000000 ug/g • 1L/1000mL = 1.5E1 mgC/mL

Daniel Bates

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs E. Cartens	Hrs

Date	Time Completed	Lab Unit Mgr 12-10-93	
12-8-93	1300	RW Schroeder	E. Cartens

54-6800-061 (R-10-83)

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: 0 745 Date: 12/08/93 Time: 11:52:40

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = BLK
Blank Value = .4426024 ug/minute C

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.00	0.00
2	1.01	1.50	100.00
3	1.51	27.10	94.46
4	2.01	41.50	34.70
5	2.51	47.60	12.82
6	3.01	50.30	5.37
7	3.51	51.50	2.33
8	4.01	52.20	1.34
9	4.51	52.80	1.14
10	5.01	53.30	0.94
11	5.51	53.70	0.74
12	6.01	53.90	0.37
13	6.51	54.30	0.74
14	7.00	54.40	0.18

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 976 TO 981.

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 = +4.4E-01 ug/min Carbon

SAMPLE RESULTS:
(54.4 - 3.100351)(11)/(200) = +2.82E+00 g/L Carbon
(54.4 - 3.100351)(11)/(200)(12) = +2.35E-01 Molar Carbon

Sample Run By: Tamia Bates
TB BATES

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BLK Date: 12/08/93 Time: 11:23:04

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BLK
Blank Value = N/A

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.00	0.00
2	1.01	0.20	100.00
3	1.51	0.70	71.43
4	2.00	1.10	36.36
5	2.50	1.30	15.38
6	3.00	1.50	13.33
7	3.50	1.70	11.76
8	4.00	2.00	15.00
9	4.50	2.20	9.09
10	5.00	2.40	8.33
11	5.50	2.50	4.00
12	6.00	2.70	7.41
13	6.50	2.80	3.57
14	7.00	3.10	9.68

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 = +4.4E-01 ug/min Carbon

< 5.50 mg/ml

Sample Run By: Tanya Bates
TB BATES

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S 747 Date: 12/03/93 Time: 12:21:38

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .4426024 ug/minute C

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

== Reading ====	Analysis Time ====	Coulometer ====	% Difference ==
1	0.51	0.20	0.00
2	1.01	0.40	50.00
3	1.51	0.80	50.00
4	2.01	1.20	33.33
5	2.51	1.30	7.69
6	3.01	1.60	18.75
7	3.51	1.90	15.79
8	4.01	1.90	0.00
9	4.50	2.10	9.52
10	5.00	2.40	12.50
11	5.50	2.50	4.00
12	6.00	2.90	13.79
13	6.50	2.90	0.00
14	7.00	3.10	6.45

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 =

+4.4E-01 ug/min Carbon

SAMPLE RESULTS:
(3.1 - 3.1)(1.1)/(200) =
(3.1 - 3.1)(1.1)/(200)(12) =

RWS 12-10-93 <5.50
< 0.00 E-3 g/L Carbon
< 6.17 E-4 Molar Carbon

Sample Run By: Tania Bates
TB BATES

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Samples: G 748 Date: 12/08/93 Time: 13:30:51

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .4426024 ug/minute C

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.20	0.00
2	1.01	0.50	60.00
3	1.51	1.40	64.29
4	2.01	2.10	33.33
5	2.51	2.50	16.00
6	3.01	2.90	13.79
7	3.51	2.90	0.00
8	4.00	3.10	6.45
9	4.50	3.40	8.82
10	5.00	3.30	10.53
11	5.50	3.80	0.00
12	6.00	4.00	5.00
13	6.51	4.40	9.09
14	7.00	4.40	0.00

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 = +4.4E-01 ug/min Carbon

SAMPLE RESULTS:
(4.4 - 3.100351)(1.1)/(200) = +7.1E-03 g/L Carbon
(4.4 - 3.100351)(1.1)/(200)(12) = +6.0E-04 Molar Carbon

Sample Run By: Danica Bates
TB BATES

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TECTOC REV 2.0

Sample: G 749 Date: 12/08/93 Time: 12:40:24

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .4426024 ug/minute C

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.60	83.33
3	1.51	1.90	68.42
4	2.01	2.30	17.39
5	2.51	2.70	14.81
6	3.01	3.10	12.90
7	3.51	3.30	6.06
8	4.01	3.50	5.71
9	4.51	3.70	5.41
10	5.01	3.90	5.13
11	5.51	4.20	7.14
12	6.01	4.40	4.55
13	6.51	4.80	8.33
14	7.00	4.80	0.00

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 = +4.4E-01 ug/min Carbon

SAMPLE RESULTS:
(4.8 - 3.100351)(1.1)/(200) = +9.3E-03 g/L Carbon
(4.8 - 3.100351)(1.1)/(200)(12) = +7.8E-04 Molar Carbon

Sample Run By: Dania Bates
TB BATES

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S 750 Date: 12/08/95 Time: 12:48:53

Analyst : TB BATES
Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .4426024 ug/minute C
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.60	83.33
3	1.51	2.20	72.73
4	2.01	3.10	29.03
5	2.51	3.60	13.89
6	3.01	3.90	7.69
7	3.51	4.40	11.36
8	4.01	4.60	4.35
9	4.51	4.80	4.17
10	5.01	5.00	4.00
11	5.51	5.20	3.85
12	6.01	5.40	3.70
13	6.51	5.60	3.57
14	7.00	5.80	3.45

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 = +4.4E-01 ug/min Carbon

SAMPLE RESULTS:
(5.8 - 3.100378)(1.1)/(200) = +1.5E-02 g/L Carbon
(5.8 - 3.100378)(1.1)/(200)(12) = +1.2E-03 Molar Carbon

Sample Run by: Dana Bates
TB BATES

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

DATA VALIDATION REPORT
for the
GROUT PRODUCT TESTS
of
TANK 241-AP-102
(Physical, Inorganic, and Radiochemical Data)

Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

January 6, 1994

TABLE OF CONTENTS

This document consists of pages 1A-1 through 1A-73, plus pages 10.1 and 11.1 and pages 2, 10.1, 11.1, 19, 21, 27, and 29 are intentionally left blank.

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ADDENDUM 1A

This document has under gone two or three pagination processes. Two are from WHC, one is from PNL and one is from HASM.

The different formats are identified as follows:

		Number Series
1)	WHC	1, 2, 3 etc
2)	WHC	1A-1, 1A-2, etc (for 222-S & PNL Addendums to original Document)
3)	HASM	000006, 000007 etc
4)	PNL	B01-001, B02-002 etc

Lola R Webb _____ 1/12/94

Lola R. Webb
Records Management Specialist

Date

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VALIDATION NARRATIVE

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Grout Product Tests for Tank 241-AP-102

Validation of the inorganic and radiochemical data associated with the Grout Product Tests for Tank 241-AP-102 (102-AP) was performed according to RCRA Level B requirements as depicted in Section 2.0, of WHC-CM-5-3, Rev. 0.

The primary objective of the data validation effort was to ensure the usability and defensibility of the data produced for the project. This was accomplished through a detailed examination of the data package to recreate the analytical process and verify that proper and acceptable analytical techniques had been applied. The data package was checked for correct submission of required deliverables, correct transcription of raw data to the summary forms, and for proper calculation of a number of parameters. An overall assessment of the data is provided on the Data Assessment Summary Form as required by WHC-CM-5-3. Assessments of individual quality control checks performed by the laboratory are located with the Data Assessment Summary Forms.

Data qualifiers are assigned to any results that have been determined to be deficient. If required, the following data qualifiers are added by the data validator to the laboratory data summary to signify the nature and magnitude of a deficiency:

U — Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ — This qualifier indicates that the analyte was analyzed for and not detected. Since a quality control deficiency has been identified during the validation process, the value reported may not accurately reflect the sample detection limit.

J — Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data is usable for decision making purposes.

R — Indicates the analyte was analyzed for and found to be unusable due to significant quality control deficiencies.

Data Validation Narrative

Analyses Performed

Waste from the 241-AP-102 (102-AP) tank was combined with Type II Portland cement, attapulgite clay, and class F fly ash in order to generate grout samples. Several analyses investigating the physical properties of the grout mixtures were conducted and included rheology, compressive strength, and pulse velocity tests. Most of the quality control requirements associated with data validation do not apply to analyses designed to examine physical characteristics, and these tests were only briefly discussed within the Data Assessment Summary Forms.

The Toxicity Characteristics Leaching Procedure (TCLP) was performed on five grout specimens composed from 102-AP tank waste and one made from water; the resulting leachate samples were then evaluated for chromium. Three grout specimens comprised of 102-AP tank waste and one composed from water were subjected to five-day and ninety-day leach tests, and the ensuing leachate accumulated during specific time intervals was analyzed for pH, nitrite, nitrate, Am-241, Tc-99, and TOC.

MAJOR DEFICIENCIES (REJECTED DATA)

- Americium-241 results which were calculated from low tracer recoveries were qualified as unusable.

MINOR DEFICIENCIES

- The Tc-99 results associated with all samples except G720, G721, G722, and G723 were qualified due to either inadequate duplicate data, unacceptable spike recoveries, or both.
- The TOC results corresponding to the following samples were determined to be non-detect as a consequence of blank contamination: G597-G600, G602, G606-G610, and G630-G634.
- The TOC values derived from the following samples were considered to be estimated due to inadequate duplicate data: G699-G701, G721-G723, and G748-G750.

REPORTING INFORMATION

The laboratory reported all of the results in tables which immediately follow the Westinghouse Case Narrative, and the sample numbers corresponding to the data listed in Tables 6-11 are identified by the grid in Table 5. The data associated with samples G698-G701, G720-G723, and G747-G750 were also listed on the Sample Data Summary sheets; as a consequence, qualifiers were inscribed on both the data tables and the Sample Data Summary sheets. Therefore, several sample results and their respective qualifiers are reported in duplicate.

Westinghouse
Hanford Company

P.O. Box 1970 Richland, WA 99352

CASE NARRATIVE

WHC-SD-WM-DP-054 REV O

Grout Product Tests
for
Tank 241-AP-102

ADDENDUM 3A

INTRODUCTION

On 4/28/93 grout feed Tank 241-AP-102 (102-AP) was sampled for a full characterization under the protocol listed in Hanford Grout Disposal Program-Campaign 102 Feed Characterization and Test Plan, WHC-SD-WM-TP-136, and Technical Project Plan for The 222-S Laboratory in Support of The Grout Treatment Facility Sampling and Characterization Plans for Tanks 105-AP, 106-AP, and 102-AP, WHC-SD-WM-TPP-008.

The results of the inorganic and radiochemical constituents are reported in WHC-SD-WM-DP-046, Revision 0. The organic analyses were performed by PNL. The grout treatment tests specified in the test plan were performed by the Process Chemistry Laboratory (PCL) and 222-S Analytical Operations (222-S). This data package reports the results of the grout product tests.

RHEOLOGY

Since the waste in 102-AP was determined to be homogeneous (the mean concentrations at each location could not be distinguished from each other), a composite solution was prepared using equal volumes of each of the 15 samples (field duplicates were not included). The dry blend, which was mixed with 102-AP waste, consisted of three components (Type II Portland cement (21%), attapulgite clay (11%), and class F fly ash (68%)).

Grout was prepared by blending seventy-five mL of the composite (102-AP waste) with 75.5 grams (g) of the dry blend (8.4 pounds per gallon) for two minutes using a separatory funnel mixer in the hot cell. The relative weight percent of each dry blend component and the mix time were recorded by PCL in laboratory notebook WHC-N-583. Two additional grout specimens were prepared using water for the liquid.

Several grout mixtures were prepared and the density, using the procedure specified in the test plan, was determined for each grout mixture. The viscosity, critical flow rate, and frictional pressure drop for each grout mixture were determined using procedure LA-519-174. The 10 minute gel strength for each grout mixture was determined using procedure LA-519-175. The drainable liquid for each grout mixture was determined using procedure LA-519-176. A Brookfield standard oil with a value of 95 centipoise was used as the standard for the viscometer. The standard results varied between 86.5 and 96.5 centipoise.

Results of the rheology tests are reported in laboratory notebook WHC-N-583 and listed in Table 1.

The summary statistics for the rheology properties are as follows.

- The mean density for the seven grout mixtures made using 102-AP waste is 13.23 pounds per gallon (lb/gal) with a standard deviation of 0.16 lb/gal. The mean density for the water grout mixtures is 11.34 lb/gal with a standard deviation of 0.35 lb/gal.

- The mean viscosity for the seven grout mixtures made using 102-AP waste is 28.3 centipoise (cP) with a standard deviation of 5.0 cP. The mean viscosity for the water grout mixtures is 9.8 cP with a standard deviation of 1.1 cP.

- The mean critical flow rate for the seven grout mixtures made using 102-AP waste is 31.4 gallons per minute (gpm) with a standard deviation of 4.4 gpm. The upper limit of a one-sided 95% confidence interval for the mean is 34.6 gpm. One of the criteria for processing (Riebling and Fadeff, 1991) is that the critical flow rate be $\leq$ 60 gpm. This grout product has a mean critical flow rate well below this limit. The mean critical flow rate for the water grout mixtures is 19.4 gpm with a standard deviation of 2.0 gpm.

- The mean frictional pressure drop for the seven grout mixtures made using 102-AP waste is 2.49 pounds force per square inch (psi) with a standard deviation of 0.73 psi. The upper limit of a one-sided 95% confidence interval for the mean is 3.02 psi. One of the criteria for processing (Riebling and Fadeff, 1991) is that the frictional pressure drop be $\leq$ 14 psi. This grout product has a mean frictional pressure drop value well below this limit. The mean frictional pressure drop for the water grout mixtures is 0.82 psi with a standard deviation of 0.20 psi.

- The mean 10-minute gel strength for the seven grout mixtures made using 102-AP waste is 13.2 pounds force per one hundred square feet ($lb_f/100\ ft^2$) with a standard deviation of 0.2 $lb_f/100\ ft^2$. The upper limit of a one-sided 95% confidence interval for the mean is 13.4 $lb_f/100\ ft^2$. One of the criteria for processing (Riebling and Fadeff,1991) is that the 10-minute gel strength be $\leq$ 100 $lb_f/100\ ft^2$. This grout product has a mean 10-minute gel strength value well below this limit. The mean 10-minute gel strength for the water grout mixtures is 13.4 $lb_f/100\ ft^2$ with a standard deviation of 0.2 $lb_f/100\ ft^2$.

After the rheology measurements were obtained the grout specimens were placed in a programmable oven and cured to a maximum temperature of 65 °C. The curing oven was programmed to simulate the adiabatic temperature rise specified in the test plan. The quantity of drainable liquid was to be estimated after one day of curing and after 15 days of curing by single visual observations. Since it was not possible to get into the curing oven in the hot cell, these observations were not performed. After the grout specimens were cured for 28 days, the specimens were removed from their container and the quantity of drainable liquid determined. No drainable liquid was observed in any of the grout specimens and therefore no drainable liquid samples were sent to 222-S Laboratory for analysis.

Pulse velocity measurements were obtained on five grout specimens (made with 102-AP waste) using procedure LA-519-181. The pulse velocity readings varied from 2176 to 2477 meter per second (m/s). The pulse velocity readings for the water grout specimens were 978 and 1102 m/s. The pulse velocity mesurements are listed in Table 2.

The compressive strength instrument was calibrated using a calibrated load cell and the calibration equation was calculated and reported in laboratory notebook WHC-N-583. Compressive strength measurements were then obtained for five grout specimens (the same specimens used for the pulse velocity measurements). These measurements are recorded in the laboratory notebook and are listed in Table 2.

The mean compressive strength is 1064 psi with a standard deviation of 521 psi. The lower limit of a one-sided 95% confidence interval for the mean is 568 psi. The NRC guideline for compressive strength is $\geq$ 60 psi (NRC, 1991) with a recommendation of $\geq$ 500 psi (NRC, 1993). This grout product has a mean greater and the associated lower limit of a one-sided 95% confidence interval for the mean greater than this criteria.

The compressive strength measurement for one of the water grout specimens was 359 psi. The second specimen cracked prior to the compressive strength measurement. It is postulated that the water grout specimens have lower compressive strength than those of the 102-AP waste grout specimens because there is more H_2O per gallon of water then H_2O per gallon of waste.

Toxicity Characteristics Leach Procedure (TCLP)

After the compressive strength measurements were completed, five grout specimens (made with 102-AP waste) and one grout specimen (made with water) were prepared for the TCLP tests through particle size reduction according to procedure LA-544-131. The analysis of 102-AP waste (see Table 3) showed Cr as the only hazardous metal that exists in concentration (630 mg/L) exceeding 20 times the TCLP limit (5 milligram per liter [mg/L]). The concentrations of the other metals (As, Ba, Cd, Pb, Hg, Se, and Ag) were lower than 20 times the corresponding limits. Thus, according to recent guideline from EPA (EPA, 1993), only Cr in the TCLP leachate samples was required to be analyzed.

The Cr was analyzed using the ICP procedure LA-505-151. The TCLP leachate samples were analyzed twice. The first measurement used a modification to the TCLP procedure where the spike was added after the preservation. The second measurement followed the TCLP procedure where the spike was added before the preservation.

Seven samples were submitted to 222-S laboratory for Cr analysis, one was an acid blank, one was from a grout mixture using water, and five were from grout mixtures using 102-AP waste. For the Cr analysis, both the beginning and ending laboratory measurement control system (LMCS) standards were within the control limits. The spike recovery for the sample with the spike added after the preservation was 90.4%, which is within limits. The spike recovery for the sample with the spike added before the preservation was 100.9%, which is within limits. The data are listed in Table 4.

The mean TCLP Cr value (spike added after the preservation) for the samples associated with 102-AP waste was 9.70E-02 mg/L with a standard deviation of

9.92E-03 mg/L. The upper limit of a 95% confidence interval for the mean is 1.06E-01 mg/L. The criteria (EPA, 1989) for Cr is 5 mg/L. Thus, the grout TCLP leachate Cr concentration is below the limit.

ADDENDUM 1A

The maximum TCLP Cr value (spike added before the preservation) observed for the samples associated with 102-AP waste was 1.4E-01 mg/L. The maximum value for the TCLP leachate Cr concentration is below the limit.

The TCLP Cr value for the sample associated with the water grout specimen is < 1.1E-01 mg/L. The spike recovery for this sample was 88.9%. The Cr value for the acid blank was 5.70E-02 mg/L.

ANSI 16.1 LEACHATE TEST

Four grout specimens (one made with water and three made with waste) were prepared for ANSI 16.1 leach testing (NRC, 1991b). The results of the 90-day ANSI leach indices are presented in this document.

The ANSI samples were submitted to 222-S laboratory for analysis of NO_2^-, NO_3^-, ^{241}Am, ^{99}Tc, TOC, and pH. The ANSI samples were not analyzed for ^{129}I because it was not detected in the 102-AP waste samples. The ANSI sample numbers are listed in Table 5. The IC analyses were performed using procedure LA-533-105, Rev. C-0. Americium-241 analysis is performed using procedures LA-503-156, Rev. D-0 and LA-508-051, Rev. A-3. Technetium-99 analyses were performed using procedure LA-438-101, Rev. D-1. The TOC analyses were performed using procedure LA-344-105, Rev. B-2. The pH analyses were performed using procedure LA-212-102, Rev. C-5. The analytical results from the ANSI samples are listed in Tables 6, 7, 8, 9, 10, and 11.

The laboratory values (except for pH) were put into a spreadsheet which calculated the leach index. For those samples where the analytical result was given as a "less than" value, the "less than" value itself was used in the spreadsheet. Therefore, the actual leach index is expected to be greater than the value obtained from the spreadsheet calculations.

The NO_2^- leach indices for the three grout specimens made with the 102-AP waste are 8.0, 8.1, and 7.6 (see Tables 12, 13, and 14). The mean leach index is 7.90 with a standard deviation of 0.26 (RSD = 3.3%). The lower limit of a one-sided 95% CI for the mean is 7.45. The criterion (Riebling and Fadeff, 1991) is 6.0. Thus, the NO_2^- grout leachate value is above the limit.

The NO_3^- leach indices for the three grout specimens made with the 102-AP waste are 8.4, 8.5, and 8.0 (see Tables 15, 16, and 17). The mean leach index is 8.30 with a standard deviation of 0.26 (RSD = 3.1%). The lower limit of a one-sided 95% CI for the mean is 7.85. The criterion (Riebling and Fadeff, 1991) is 6.0. Thus, the NO_3^- grout leachate value is above the limit.

Since "less than" analytical results existed for the leachate samples, the ^{99}Tc leach index is a "greater than" value. The leach indices for the three grout specimens made with the 102-AP waste are > 7.3, 8.2, and > 7.2 (see Tables 18, 19, 20). Summary statistics were not calculated due to the "greater than" values.

Since "less than" analytical results (detection limits) existed for the ^{241}Am leachate samples, the leach index is a "greater than" value. The leach indices for the three specimens made with the 102-AP waste are > 5.3, > 5.7,

and > 5.7 (see Tables 21, 22, and 23). Summary statistics were not calculated due to the "greater than" values. Since all but one analytical result were below the detection limit, the three leach indices may not be meaningful because the actual leach index for ^{241}Am may be much higher.

Since "less than" analytical results existed for the TOC leachate samples, the leach index is a "greater than" value. The leach indices for the three specimens made with the 102-AP waste are > 7.7, > 7.8, and > 7.7 (see Tables 24, 25, and 26). Summary statistics were not calculated due to the "greater than" values.

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DATA SUMMARY TABLES

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Table 1. 102-AP Rheology Results.

Grout sample	Density (lb/gal)	Viscosity (cP)	Critical flow rate (gpm)	Frictional pressure drop (psi)	10 Minute gel strength ($lb_f/100\ ft^2$)
Water - 1	11.09	9.053	17.957	0.679	NA
Water - 2	11.59	10.581	20.825	0.955	13.53
102AP - 1	13.03	24.696	30.378	2.284	13.36
102AP - 2	13.14	30.112	34.272	2.931	13.43
102AP - 3	13.28	32.395	34.453	2.994	12.96
102AP - 4	13.13	35.398	38.238	3.646	12.82
102AP - 5	13.43	NA	NA	NA	NA
102AP - Gas1	13.25	23.759	26.679	1.791	13.34
102AP - Gas2	13.11	22.835	26.605	1.632	NA
102AP - Gas3	13.50	27.636	28.989	2.155	13.29
Summary statistics for the 102-AP grout samples					
N	8	7	7	7	6
mean	13.23	28.262	31.373	2.490	13.20
standard deviation	0.16	4.992	4.406	0.726	0.248
UL-95% CI mean	13.34	31.928	34.609	3.023	13.404
criterion	None	None	≤ 60	≤ 14	≤ 100

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Table 2. 102-AP Compressive Strength/Pulse Velocity Results.

Grout sample	Compressive strength (psi)		Pulse velocity (m/s)
102-AP - 1	1887		2304
102-AP - 2	753		2176
102-AP - 3	953		2457
102-AP - 4	1196		2477
102-AP - 5	533		2387
Water - 1	NA		978
Water - 2	359		1102
Summary statistics for the 102-AP grout samples			
N	5	required criterion ≥ 60 psi	
mean	1064.4 psi	recommended criterion ≥ 500 psi	
standard deviation	521.0 psi		
LL 95% CI - mean	567.6 psi		

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Table 3. Concentration of Hazardous Metals in 102-AP Waste.

Analyte	Concentration limits	Required quantitation limits	Mean of the sample results () = number of observations
As	5 mg/L	0.5 mg/L	< 0.25 mg/L (3)
Ba	100 mg/L	10 mg/L	0.284 mg/L (13)
Cd	1 mg/L	0.1 mg/L	1.47 mg/L (15)
Cr	5 mg/L	0.5 mg/L	6.302 E2 mg/L (15)
Pb	5 mg/L	0.5 mg/L	< 1.55 mg/L (15)
Hg	0.2 mg/L	0.02 mg/L	< 0.01 mg/L (4)
Se	1 mg/L	0.1 mg/L	0.367 mg/L (9)
Ag	5 mg/L	0.5 mg/L	< 0.125 mg/L (15)

Table 4. 102-AP Grout TCLP Cr Leachate Results.

TCLP Cr results				
Sample numbers			Cr result (µg/mL or mg/L)	
Type	AP	BP	Spike added after preservation	Spike added before preservation
(Reagent)	G679	G734	5.70E-02	< 1.1E-01
(Water Grout)	G680	G735	2.32E-01	1.48E-01
(102AP Grout)	G681	G728	9.50E-02 *	8.29E-02 * < 1.1E-01
(102AP Grout)	G682	G729	1.03E-01	< 1.1E-01
(102AP Grout)	G683	G731	1.10E-01	< 1.1E-01
(102AP Grout)	G684	G732	8.40E-02	1.4E-01
(102AP Grout)	G685	G733	9.30E-02	< 1.1E-01
Summary statistics (102AP grout samples)				
N mean standard deviation UL 95% CI - mean			5 9.70E-02 9.92E-03 1.06E-01	Maximum concentration is 1.4E-01

AP: Spike added after the preservation.
BP: Spike added before the preservation.
*: Spike was added to this sample.

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Table 5. 102-AP Grout ANSI Sample Numbers.

Sample numbers				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	1C2AP grout sample 3
0 (Wash)	G597	G608	G622	G633
1 (2 Hours)	G598	G609	G623	G634
2 (7 Hours)	G599	G610	G624	G637
3 (24 Hours)	G600	G614	G625	G638
4 (48 Hours)	G601	G615	G626	G639
5 (72 Hours)	G602	G616	G630	G640
6 (96 Hours)	G606	G617	G631	G641
7 (120 Hours)	G607	G618	G632	G642
8 (456 Hours)	G747	G748	G749	G750
9 (1128 Hours)	G698	G699	G700	G701
10 (2160 Hours)	G720	G721	G722	G723

Table 6. 102-AP Grout ANSI pH Results.

pH				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	1.07E+01	9.44E+00	8.49E+00	8.15E+00
1	1.06E+01	9.87E+00	9.94E+00	1.05E+01
2	1.04E+01	9.81E+00	9.82E+00	9.75E+00
3	1.08E+01	1.00E+01	9.45E+00	9.99E+00
4	1.08E+01	1.02E+01	1.01E+01	1.02E+01
5	1.06E+01	1.01E+01	1.03E+01	1.01E+01
6	1.04E+01	1.01E+01	1.02E+01	1.01E+01
7	1.04E+01	1.00E+01	1.01E+01	1.00E+01
8	1.14E+01	1.11E+01	1.11E+01	1.11E+01
9	9.93E+00 9.37E+00	9.44E+00 9.91E+00	1.10E+01 1.09E+01	1.10E+01 1.10E+01
10	1.12E+01	1.11E+01	1.11E+01	1.11E+01

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Table 7. 102-AP Grout ANSI NO_2^- Results.

NO_2^- (µg/mL)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	< 1	7.91E+00	6.74E+00	1.57E+01
1	< 1	3.64E+01	4.51E+01	5.74E+01
2	< 1	2.29E+01	2.78E+01	4.36E+01
3	< 1	4.27E+01	5.24E+01	8.27E+01
4	< 1	3.79E+01	4.91E+01	7.42E+01
5	< 1	2.88E+01	3.67E+01	5.43E+01
6	< 1	2.46E+01	3.16E+01	4.70E+01
7	< 1	2.10E+01	2.75E+01	3.93E+01
8	< 1	2.03E+02	2.43E+02	3.35E+02
9	< 1	1.99E+02	2.00E+02	2.45E+02
10	< 1	1.56E+02	1.41E+02	1.50E+02

Table 8. 102-AP Grout ANSI NO_3^- Results.

NO_3^- (µg/mL)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	< 1	1.07E+01	9.03E+00	2.25E+01
1	< 1	4.69E+01	5.73E+01	7.37E+01
2	< 1	3.01E+01	3.63E+01	5.47E+01
3	< 1	5.42E+01	6.56E+01	1.03E+02
4	< 1	4.86E+01	6.18E+01	9.12E+01
5	< 1	3.70E+01	4.70E+01	6.83E+01
6	< 1	3.19E+01	4.11E+01	5.94E+01
7	< 1	2.76E+01	3.64E+01	5.00E+01
8	< 1	2.66E+02	3.17E+02	4.54E+02
9	< 1	2.63E+02	2.69E+02	3.43E+02
10	< 1	2.12E+02	1.92E+02	2.14E+02

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Table 9. 102-AP Grout ANSI ^{99}Tc Results.

^{99}Tc ($\mu Ci/mL$)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	< UJ 1.47E-05	J 2.23E-05	J 3.20E-05	J 3.40E-05
1	< UJ 1.45E-05	J 7.64E-05	J 9.40E-05	J 1.22E-04
2	< UJ 1.45E-05	J 4.16E-05	J 5.27E-05	< UJ 2.80E-04
3	< UJ 1.45E-05	J 4.70E-04	J 9.07E-05	J 4.50E-04
4	< UJ 1.46E-05	J 5.69E-04	J 8.55E-05	J 3.31E-04
5	< UJ 1.53E-05	< UJ 3.00E-04	J 7.48E-05	< UJ 2.84E-04
6	< UJ 9.26E-06	J 3.32E-04	J 7.22E-05	< UJ 2.79E-04
7	< UJ 9.56E-06	J 3.60E-04	J 5.85E-05	< UJ 2.84E-04
8	< UJ 1.06E-05	J 3.73E-04	J 4.12E-04	J 6.08E-04
9	< UJ 8.14E-06	J 3.94E-04	J 3.79E-04	J 4.64E-04
10	< 7.07E-06	3.16E-04	2.84E-04	3.11E-04

Table 10. 102-AP ANSI ^{241}Am Results.

^{241}Am ($\mu Ci/mL$)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	< R 6.37E-06	< R 6.37E-06	< R 6.37E-06	< 1.27E-05
1	< R 6.37E-06	< 6.37E-06	< R 6.37E-06	< R 1.27E-05
2	< R 6.37E-06	< R 6.37E-06	< R 6.37E-06	< R 6.37E-06
3	< R 6.37E-06	< 1.27E-05	< 6.37E-06	< 6.37E-06
4	< R 6.37E-06	< R 1.27E-05	< 6.37E-06	< 6.37E-06
5	< R 6.37E-06	< R 1.27E-05	< R 1.27E-05	< 6.37E-06
6	< R 6.37E-06	< 1.27E-05	< 1.27E-05	R 7.64E-06
7	< R 6.37E-06	< R 1.27E-05	< R 1.27E-05	< 6.37E-06
8	< R 3.40E-05	< R 3.40E-05	R 5.48E-05	< R 3.40E-05
9	< R 1.27E-05	< 1.27E-05	< 1.27E-05	< 1.27E-05
10	< 1.27E-05	< 1.27E-05	< R 1.27E-05	< R 1.27E-05

Table 11. 102-AP Grout ANSI TOC Results.

TOC (µg/mL)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	4.07E+01 U	1.20E+01 U	< 5.50E+00	7.70E+00 U
1	6.33E+01 U	7.70E+00 U	< 5.50E+00	9.40E+00 U
2	2.81E+01 U	7.70E+00 U	< 5.50E+00	< 5.50E+00
3	5.50E+00 U	< 5.50E+00	< 5.50E+00	< 5.50E+00
4	< 5.50E+00	< 5.50E+00	< 5.50E+00	< 5.50E+00
5	5.50E+00 U	< 5.50E+00	1.60E+01 U	< 5.50E+00
6	1.90E+01 U	< 5.50E+00	8.20E+00 U	< 5.50E+00
7	1.40E+01 U	< 5.50E+00	5.50E+00 U	< 5.50E+00
8	< 5.00E+00	7.10E+00 J	9.30E+00 J	1.50E+01 J
9	< 5.50E+00	< 5.50E+00 UJ	7.70E+00 J	1.10E+01 J
10	< 5.50E+00	< 5.50E+00 UJ	7.15E+00 J	8.8 E+00 J

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SAMPLE DATA SUMMARY

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pH

RESULTS ID:	SAMPLE	QC RESULTS BEGIN STD % REC	QC RESULTS BLANK	QC ID INFO. BEGIN STD ID:	QC ID INFO. BLANK I.D.
G698	9.37	100.20	NA	G696	NA
G699	9.91	100.20	NA	G696	NA
G700	10.92	100.20	NA	G696	NA
G701	11.02	100.20	NA	G696	NA
G720	11.17	101.00	NA	G718	NA
G721	11.09	101.00	NA	G718	NA
G722	11.05	101.00	NA	G718	NA
G723	11.14	101.00	NA	G718	NA
G747	11.44	100.10	5.50	G745	G746
G748	11.12	100.10	5.50	G745	G746
G749	11.11	100.10	5.50	G745	G746
G750	11.11	100.10	5.50	G745	G746

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WHC-SD-WM-DP-054 REV 0
ADDENDUM 1A

1A 23 63

ION CHROMATOGRAPHY

RESULTS			QC RESULTS		QC ID INFO.	
ID	ANALYTE	SAMPLE ug/ml	BEG STD % REC	BLANK ug/ml	BEG STD ID:	BLANK I.D.
G698	NO2	<1.0E+00	95.86	<1.0E+00	G696	G697
G699	NO2	1.99E+02	95.86	<1.0E+00	G696	G697
G700	NO2	2.00E+02	95.86	<1.0E+00	G696	G697
G701	NO2	2.45E+02	95.86	<1.0E+00	G696	G697
G720	NO2	<1.0E+00	95.86	<1.0E+00	G718	G719
G721	NO2	1.56E+02	95.86	<1.0E+00	G718	G719
G722	NO2	1.41E+02	95.86	<1.0E+00	G718	G719
G723	NO2	1.50E+02	95.86	<1.0E+00	G718	G719
G747	NO2	<1.0E+00	98.66	<1.0E+00	G745	G746
G748	NO2	2.03E+02	98.66	<1.0E+00	G745	G746
G749	NO2	2.43E+02	98.66	<1.0E+00	G745	G746
G750	NO2	3.35E+02	98.66	<1.0E+00	G745	G746
G698	NO3	<1.0E+00	98.27	<1.0	G696	G697
G699	NO3	2.63E+02	98.27	<1.0	G696	G697
G700	NO3	2.69E+02	98.27	<1.0	G696	G697
G701	NO3	3.43E+02	98.27	<1.0	G696	G697
G720	NO3	<1.0E+00	97.93	<1.0	G718	G719
G721	NO3	2.13E+02	97.93	<1.0	G718	G719
G722	NO3	1.93E+02	97.93	<1.0	G718	G719
G723	NO3	2.15E+02	97.93	<1.0	G718	G719
G747	NO3	<1.0E+00	98.96	<1.0	G745	G746
G748	NO3	2.66E+02	98.96	<1.0	G745	G746
G749	NO3	3.17E+02	98.96	<1.0	G745	G746
G750	NO3	4.54E+02	98.96	<1.0	G745	G746

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Am-241

	RESULTS		QC RESULTS		QC ID INFO	
	ID:	SAMPLE uci/ml	BEGIN STD % REC	BLANK uci/ml	BEGIN STD ID:	BLANK I.D.
R	G698	<1.27E-05	100.00	<1.27E-05	G696	G697
	G699	<1.27E-05	100.00	<1.27E-05	G696	G697
	G700	<1.27E-05	100.00	<1.27E-05	G696	G697
	G701	<1.27E-05	100.00	<1.27E-05	G696	G697
	G720	<1.27E-05	108.20	<1.27E-05	G178	G719
	G721	<1.27E-05	108.20	<1.27E-05	G178	G719
R	G722	<1.27E-05	108.20	<1.27E-05	G178	G719
R	G723	<1.27E-05	108.20	<1.27E-05	G178	G719
R	G747	<3.40E-05	122.80	<3.40E-05	G754	G746
R	G748	<3.40E-05	97.40	<3.40E-05	G754	G746
R	G749	5.48E-05	97.40	<3.40E-05	G754	G746
R	G750	<3.40E-05	122.80	<3.40E-05	G754	G746

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Tc-99

	RESULTS ID:	SAMPLE		QC RESULTS: BEGIN STD % REC	BLANK	QC ID INFO. BEG STD ID:	BLANK I.D.
		uCi/ml			uCi/ml		
UJ	G698	<8.14E-06		95.90	<8.38E-06	G696	G697
J	G699	3.94E-04		95.90	<8.38E-06	G696	G697
J	G700	3.79E-04		95.90	<8.38E-06	G696	G697
J	G701	4.64E-04		95.90	<8.38E-06	G696	G697
	G720	<7.07E-06		89.60	1.47E-05	G718	G719
	G721	3.16E-04		89.60	1.47E-05	G718	G719
	G722	2.84E-04		89.60	1.47E-05	G718	G719
	G723	3.11E-04		89.60	1.47E-05	G718	G719
UJ	G747	<1.06E-05		103.10	8.78E-06	G745	G746
J	G748	3.73E-04		103.10	8.78E-06	G745	G746
J	G749	4.12E-04		103.10	8.78E-06	G745	G746
J	G750	6.08E-04		103.10	8.78E-06	G745	G746

14.25

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TOC

RESULTS ID:	SAMPLE ugC/mL	QC RESULTS BEGIN STD % REC	BLANK ugC/mL	QC ID INFO BEGIN STD ID:	BLANK I.D.
G698	<5.50E+00	95.00	<5.50E+00	G696	G697
G699	<5.50E+00	95.00	<5.50E+00	G696	G697
G700	7.70E+00	95.00	<5.50E+00	G696	G697
G701	1.10E+01	95.00	<5.50E+00	G696	G697
G720	<5.50E+00	96.00	<5.50E+00	G718	G719
G721	<5.50E+00	96.00	<5.50E+00	G718	G719
G722	7.15E+00	96.00	<5.50E+00	G718	G719
G723	8.80E+00	96.00	<5.50E+00	G718	G719
G747	<5.50E00	94.60	<5.50E+00	G745	G746
G748	7.10E+00	94.60	<5.50E+00	G745	G746
G749	9.30E+00	94.60	<5.50E+00	G745	G746
G750	1.50E+01	94.60	<5.50E+00	G745	G746

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1/5/94

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DATA ASSESSMENT SUMMARY TABLES

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ADDENDUM 1A

RHEOLOGY AND COMPRESSIVE STRENGTH DATA ASSESSMENT

DATE	1-5-94	**SAMPLES/MATRIX**	102-AP Tank Waste Grout Mixture
REVIEWED BY	A. T. DiCenso		
LABORATORY	222-S		
CASE #	Grout Test Project		
SDG #	241-AP-102		

DATA ASSESSMENT SUMMARY

		Rheology	Comp. Strength/Pulse Velocity
1.	Chain of Custody	O	O
2.	Preparation Blanks	N/A	N/A
3.	Duplicate Analysis	O	O
4.	Spike Recoveries	N/A	N/A
5.	Other Quality Control	N/A	N/A

O = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: No problems were found with the data.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

RHEOLOGY AND COMPRESSIVE STRENGTH QC

Name A. T. DiCenso Date 1-5-94

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. Furthermore, the physical evaluations were not subject to holding time requirements due to the nature of the tests.

ACTION: No action was required.

sample #	constituent	value/qualifier

RHEOLOGY AND COMPRESSIVE STRENGTH QC

Name A. T. DiCenso Date 1-5-94

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks were not applicable to the tests.

ACTION: No action was required.

sample #	constituent	value/qualifier

RHEOLOGY AND COMPRESSIVE STRENGTH QC

Name A. T. DiCenso Date 1-5-94

QC Check: DUPLICATE ANALYSIS

COMMENTS: With respect to each physical test, 5-8 analyses were conducted with the 102-AP tank waste grout mixture. Average and standard deviation values were calculated for each evaluation, and all results were satisfactory.

ACTION: No action was required.

sample #	constituent	value/qualifier

RHEOLOGY AND COMPRESSIVE STRENGTH QC

Name A. T. DiCenso Date 1-5-94

QC Check: SPIKE RECOVERIES

COMMENTS: Matrix spike analyses were not applicable to the tests.

ACTION: No action was required.

sample #	constituent	value/qualifier

ADDENDUM 1A

CHROMIUM ANALYSIS DATA ASSESSMENT

DATE	Jan. 5, 1994	**SAMPLES/MATRIX**	G679-G685
REVIEWED BY	D.S. De Lorenzo		~~G727-G729~~ G723-G727
LABORATORY	222-S		G731-G735
CASE #	Grout Test Project		
SDG #	241-AP-102		

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DATA ASSESSMENT SUMMARY

		Cr			
1.	Chain of Custody	O			
2.	Preparation Blanks	O			
3.	Duplicate Analysis	O			
4.	Spike Recoveries	O			
5.	Other Quality Control	N/A			

O = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: All quality control criteria were met, with no exceptions.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

ICP ANALYSIS QC

Name D.S. De Lorenzo **Date** Jan. 5, 1994

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4/28/93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to TCLP tests, and the resulting leachate samples were evaluated for Cr. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications are irrelevant.

ACTION: No action was required.

sample #	constituent	value/qualifier

ADDENDUM 1A
ICP ANALYSIS QC

Name D.S. De Lorenzo Date Jan. 5, 1994

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks are evaluated for the presence of contaminants, and at least one preparation blank is required for each sample batch. If the concentration of an analyte in a sample is less than 5 times the concentration exhibited by the analyte in the blank, the associated results are qualified as non-detected (U).

ACTION: The blanks were free of contamination, and no action was required.

sample #	constituent	value/qualifier

ICP ANALYSIS QC

Name D.S. De Lorenzo Date Jan. 5, 1994

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. Chromium was determined for 5-day leached grout specimens through ICP analysis. Grout specimens were prepared by blending composite 102-AP waste with a dry blend consisting of Type II Portland cement, attapulgite clay, and class F fly ash. Additional grout specimens were prepared using water as the liquid instead of using the composite waste.

Five 102-AP grout samples were evaluated for Cr, in addition to grout water samples. Duplicate analyses were not performed. The laboratory, however, states that "Since the waste in 102-AP was determined to be homogenous (the mean concentrations at each location could not be distinguished from each other), a composite solution was prepared..." In order to evaluate precision with respect to grout sample preparation and method performance, the percent Relative Standard Deviation (%RSD) of the five-time analyses was calculated for the 5-day leach-time interval. Percent RSD values exceeding 20% indicate imprecision with respect to sample heterogeneity, grout sample preparation, or method performance, and the associated results will be qualified as estimated (J or UJ). (Relative Standard Deviation is equal to the sample standard deviation divided by the mean value.)

TCLP Cr Results	%RSD
Spike added after preservation (AP)	10.2%
Spike added before preservation (BP)	NC

NC - not calculable (some or all sample results below the detection limit)

ACTION: No action required.

sample #	constituent	value/qualifier

ICP ANALYSIS QC

Name D.S. De Lorenzo Date Jan. 5, 1994

QC Check: SPIKE RECOVERIES

COMMENTS: Matrix spike sample analysis provides information about the effect of each sample matrix on the digestion and measurement methodology. Matrix spikes must be analyzed with every analytical batch or every 20 samples, whichever is more frequent, and recoveries should be between 75-125%. If the spike result is between 30-74% or >125%, results are qualified as estimated. Sample results associated with a spike recovery of less than 30% are qualified as unusable.

ACTION: No action required.

sample #	constituent	value/qualifier

NITRATE AND NITRATE DATA ASSESSMENT

DATE	Jan. 5, 1994	SAMPLES/MATRIX	G597-G602
			G606-G610
REVIEWED BY	D.S. De Lorenzo		G614-G618
			G622-G626
LABORATORY	222-S		G630-G634
			G637-G642
CASE #	Grout Test Project		G698-G701
			G720-G723
SDG #	241-AP-102		G747-G750

DSD 1/5/94

DATA ASSESSMENT SUMMARY

		NO_2	NO_3		
1.	Chain of Custody	0	0		
2.	Preparation Blanks	0	0		
3.	Duplicate Analysis	0	0		
4.	Spike Recoveries	0	0		
5.	Other Quality Control	N/A	N/A		

0 = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: All quality control criteria were met, with no exceptions.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

ADDENDUM 1A
ANION ANALYSIS QC

Name D.S. De Lorenzo **Date** Jan. 5, 1994

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4/28/93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for NO_2 and NO_3. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications are irrelevant.

ACTION: No action was required.

sample #	constituent	value/qualifier

/A-41

ADDENDUM 1A

ANION ANALYSIS QC

Name D.S. De Lorenzo Date Jan. 5, 1994

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks are evaluated for the presence of contaminants, and at least one preparation blank is required for each sample batch. If the concentration of an analyte in a sample is less than 5 times the concentration exhibited by the analyte in the blank, the associated results are qualified as non-detected (U).

ACTION: The blanks were free of contamination, and no action was required.

sample #	constituent	value/qualifier

ADDENDUM 1A

ANION ANALYSIS QC

Name D.S. De Lorenzo Date Jan. 5, 1994

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens were evaluated for NO_2 and NO_3 through 5-day and 90-day anion analyses. For each time period, triplicate analyses were performed (three samples evaluated). Grout specimens were prepared by blending composite 102-AP waste with a dry blend consisting of Type II Portland cement, attapulgite clay, and class F fly ash. Additional grout specimens were prepared using water as the liquid instead of using the composite waste.

Three 102-AP grout samples were evaluated for NO_2 and NO_3, in addition to a grout water sample. Duplicate analyses were performed for the 90-day leachate, with percent Relative Standard Deviation (%RPD) values all less than 1.0%. It is therefore reasonable to believe that the precision of the ion chromatography anion analysis methods is acceptable.

The laboratory, however, states that "Since the waste in 102-AP was determined to be homogenous (the mean concentrations at each location could not be distinguished from each other), a composite solution was prepared..." In order to evaluate precision with respect to grout sample preparation, the percent Relative Standard Deviation (%RSD) of the triplicate analyses was calculated for each leach-time interval. Percent RSD values exceeding 20% indicate imprecision with respect to sample heterogeneity or grout sample preparation. (Relative Standard Deviation is equal to the sample standard deviation divided by the mean value.)

Time Period	NO_2 %RSD	NO_3 %RSD
0 (Wash)	48.1%	52.2%
1 (2 hours)	22.8%	22.8%
2 (7 hours)	34.4%	31.7%
3 (24 hours)	35.2%	34.4%
4 (48 hours)	34.6%	32.5%
5 (72 hours)	32.7%	31.5%
6 (96 hours)	33.3%	31.7%
7 (120 hours)	31.7%	29.7%
8 (456 hours)	26.0%	28.1%
9 (1128 hours)	12.2%	15.3%
10 (2160 hours)	5.1%	5.9%

ACTION: Duplicate analyses which allowed for the calculation of relative percent differences were conducted on the 90-day leachate samples and yielded values of less than 1%; therefore, the %RSD data was not utilized to qualify the results but was provided for information purposes.

sample #	constituent	value/qualifier

1-11-94

ADDENDUM 1A

ANION ANALYSIS QC

Name D.S. De Lorenzo Date Jan. 5, 1994

QC Check: SPIKE RECOVERIES

COMMENTS: Matrix spikes are used in to indicate overall accuracy for a given matrix. Spike analyses were not performed for the NO_2 or NO_3 determinations. In the absence of spike recovery data, performance of the Laboratory Control Standard (LCS), or blank spike, shall be considered. Results outside of the control limits are qualified as estimated or unusable based on the judgement of the reviewer. In all cases, the LCS recoveries were within the applicable control limits.

ACTION: No action required.

sample #	constituent	value/qualifier

Am-241 DATA ASSESSMENT

DATE	1-5-94	SAMPLES/MATRIX	G597-G602 G606-G610 G614-G618 G622-G626 G630-G634 G637-G642 G698-G701 G720-G723 G747-G750
REVIEWED BY	A. T. DiCenso 1-6-94		
LABORATORY	222-S		
CASE #	Grout Test Project		
SDG #	241-AP-102		

DATA ASSESSMENT SUMMARY

		Am-241			
1.	Chain of Custody	O			
2.	Preparation Blanks	O			
3.	Duplicate Analysis	O			
4.	Tracer Recoveries	M			
5.	Other Quality Control	N/A			

O = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: Results calculated from inadequate tracer recoveries were qualified as unusable.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

ADDENDUM 1A
Am-241 QC

Name A. T. DiCenso Date 1-5-94

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for Am-241. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

sample #	constituent	value/qualifier

Am-241 QC

Name A. T. DiCenso Date 1-5-94

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks are evaluated for the presence of contaminants, and at least one preparation blank is required for each sample batch. If the concentration of an analyte in a sample is less than 5 times the concentration exhibited by the analyte in the blank, the associated results are qualified as non-detected (U).

ACTION: The blank data were satisfactory, and no action was required.

sample #	constituent	value/qualifier

ADDENDUM 1A

Am-241 QC

Name A. T. DiCenso Date 1-5-94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for Am-241 consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the Am-241 analyses were actually run in triplicate. All grout results within each leachate time interval were either non-detect or near the detection limit; therefore, the reported data were considered to be acceptable with respect to precision requirements.

ACTION: No action was required.

sample #	constituent	value/qualifier

Am-241 QC

Name A. T. DiCenso Date 1-5-94

QC Check: TRACER RECOVERIES

COMMENTS: Tracers are used in radiochemical analyses to indicate overall accuracy for a given matrix. Results calculated from tracer recoveries of less than 30% or greater than 115% were qualified as unusable (R).

ACTION: The following data were qualified due to unacceptable tracer recoveries.

sample #	constituent	value/qualifier	
G597	Am-241	< 6.37E-6 uCi/ml	R
G598	Am-241	< 6.37E-6	R
G599	Am-241	< 6.37E-6	R
G600	Am-241	< 6.37E-6	R
G601	Am-241	< 6.37E-6	R
G602	Am-241	< 6.37E-6	R
G606	Am-241	< 6.37E-6	R
G607	Am-241	< 6.37E-6	R
G608	Am-241	< 6.37E-6	R
G610	Am-241	< 6.37E-6	R
G615	Am-241	< 1.27E-5	R
G616	Am-241	< 1.27E-5	R
G618	Am-241	< 1.27E-5	R
G622	Am-241	< 6.37E-6	R
G623	Am-241	< 6.37E-6	R
G624	Am-241	< 6.37E-6	R
G630	Am-241	< 1.27E-5	R
G632	Am-241	< 1.27E-5	R
G634	Am-241	< 1.27E-5	R
G637	Am-241	< 6.37E-6	R
G641	Am-241	7.64E-6	R
G698	Am-241	< 1.27E-5	R
G722	Am-241	< 1.27E-5	R
G723	Am-241	< 1.27E-5	R
G747	Am-241	< 3.40E-5	R
G748	Am-241	< 3.40E-5	R
G749	Am-241	5.48E-5	R
G750	Am-241	< 3.40E-5	R

ADDENDUM 1A

Tc-99 DATA ASSESSMENT

DATE	1-3-94	SAMPLES/MATRIX	G597-G602
			G606-G610
REVIEWED BY	A. T. DiCenso 1-6-94		G614-G618
			G622-G626
LABORATORY	222-S		G630-G634
			G637-G642
CASE #	Grout Test Project		G698-G701
			G720-G723
SDG #	241-AP-102		G747-G750

DATA ASSESSMENT SUMMARY

		Tc-99			
1.	Chain of Custody	O			
2.	Preparation Blanks	O			
3.	Duplicate Analysis	X			
4.	Spike Recoveries	X			
5.	Other Quality Control	N/A			

O = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The data associated with all samples except G720, G721, G722, and G723 were qualified with respect to either the duplicate data, spike data, or both.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

ADDENDUM 1A

Tc-99 QC

Name A. T. DiCenso Date 1-3-94

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for Tc-99. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

sample #	constituent	value/qualifier

Tc-99 QC

Name A. T. DiCenso **Date** 1-3-94

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks are evaluated for the presence of contaminants, and at least one preparation blank is required for each sample batch. If the concentration of an analyte in a sample is less than 5 times the concentration exhibited by the analyte in the blank, the associated results are qualified as non-detected (U).

ACTION: The blank data were satisfactory, and no action was required.

sample #	constituent	value/qualifier

ADDENDUM 1A

Tc-99 QC

Name A. T. DiCenso Date 1-3-94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for Tc-99 consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the Tc-99 analyses were actually run in triplicate. In order to evaluate precision, the percent relative standard deviation (%RSD) was calculated for each time interval in which all three grout mixtures yielded a detectable Tc-99 value. The results of these calculations are listed in the following table.

Time Period	%RSD
0	21.3%
1	23.6%
3	63.4%
4	73.6%
8	27.1%
9	11.0%
10	5.66%

The %RSD values pertaining to time periods 0, 1, 3, 4, and 8 were greater than 20%, and the data corresponding to time periods 2, 5, 6, and 7 could not verify precision since each time interval yielded both detect and non-detect results. Therefore, all data associated with grout specimens composed from tank waste pertaining to time intervals 0-8 were considered to be estimated. This interpretation of the duplicate data, however, cannot accurately determine whether the imprecision encountered in the analyses is due to method error or sample heterogeneity, but in this validator's opinion, it is most likely due to the latter.

ACTION: The data were qualified as indicated by the following table.

sample #	constituent	value/qualifier	
G608	Tc-99	2.23E-5	J
G609	Tc-99	7.64E-5	J
G610	Tc-99	4.16E-5	J
G614	Tc-99	4.70E-4	J
G615	Tc-99	5.69E-4	J
G616	Tc-99	< 3.00E-4	UJ
G617	Tc-99	3.32E-4	J
G618	Tc-99	3.60E-4	J
G622	Tc-99	3.20E-5	J
G623	Tc-99	9.40E-5	J
G624	Tc-99	5.27E-5	J
G625	Tc-99	9.07E-5	J

Tc-99 QC

Name A. T. DiCenso Date 1-3-94

QC Check: DUPLICATE ANALYSIS (continued)

sample #	constituent	value/qualifier	
G626	Tc-99	8.55E-5	J
G630	Tc-99	7.48E-5	J
G631	Tc-99	7.22E-5	J
G632	Tc-99	5.85E-5	J
G633	Tc-99	3.40E-5	J
G634	Tc-99	1.22E-4	J
G637	Tc-99	< 2.80E-4	UJ
G638	Tc-99	4.50E-4	J
G639	Tc-99	3.31E-4	J
G640	Tc-99	< 2.84E-4	UJ
G641	Tc-99	< 2.79E-4	UJ
G642	Tc-99	< 2.84E-4	UJ
G748	Tc-99	3.73E-4	J
G749	Tc-99	4.12E-4	J
G750	Tc-99	6.08E-4	J

Tc-99 QC

Name A. T. DiCenso Date 1-3-94

QC Check: SPIKE RECOVERIES

COMMENTS: Matrix spikes are used in radiochemical analyses to indicate overall accuracy for a given matrix. The recoveries associated with spikes shall be within three standard deviations of normal operating conditions. When laboratory defined control limits are not available, spike recoveries must be between 75 and 125%. Results outside the limits are qualified as estimated or unusable based on the judgement of the reviewer.

ACTION: The following data failed to satisfy the established criteria.

sample #	constituent	value/qualifier	
G597	Tc-99	< 1.47E-5 uCi/ml	UJ
G598	Tc-99	< 1.45E-5	UJ
G599	Tc-99	< 1.45E-5	UJ
G600	Tc-99	< 1.45E-5	UJ
G601	Tc-99	< 1.46E-5	UJ
G602	Tc-99	< 1.53E-5	UJ
G606	Tc-99	< 9.26E-6	UJ
G607	Tc-99	< 9.56E-6	UJ
G608	Tc-99	2.23E-5	J
G609	Tc-99	7.64E-5	J
G610	Tc-99	4.16E-5	J
G622	Tc-99	3.20E-5	J
G623	Tc-99	9.40E-5	J
G624	Tc-99	5.27E-5	J
G625	Tc-99	9.07E-5	J
G626	Tc-99	8.55E-5	J
G630	Tc-99	7.48E-5	J
G631	Tc-99	7.22E-5	J
G632	Tc-99	5.85E-5	J
G633	Tc-99	3.40E-5	J
G634	Tc-99	1.22E-4	J
G698	Tc-99	< 8.14E-6	UJ
G699	Tc-99	3.94E-4	J
G700	Tc-99	3.79E-4	J
G701	Tc-99	4.64E-4	J
G747	Tc-99	< 1.06E-5	UJ
G748	Tc-99	3.73E-4	J
G749	Tc-99	4.12E-4	J
G750	Tc-99	6.08E-4	J

WET CHEMISTRY DATA ASSESSMENT

DATE	01/04/94	**SAMPLES/MATRIX**	G597 - G602
REVIEWED BY	J.D. Franklin JDF 1/4/94		G606 - G610
LABORATORY	222S		G614 - G618
CASE #	GROUT PRODUCT TEST		G622 - G626
SDG #	241-AP-102		G630 - G634
			G637 - G642

DATA ASSESSMENT SUMMARY

		TOC
1.	Chain of Custody/Holding Times	O
2.	Blanks	X
3.	Laboratory Control Sample	O
4.	Duplicate Analysis	O

O = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The composite nature of the original sample, and the use of the sample to manufacture a new sample source enabled the modification of some of the validation standards. The criteria for custody/holding times and duplicate analysis were modified, and the LCS data were evaluated in place of the matrix spike/matrix spike duplicate data. All blanks in this sample series were contaminated.

NOTES: The analyses were conducted in accordance with 222S Laboratory Procedure No. LA-344-105 B-2, at the five-day interval. The data were validated to 'B' level criteria.

ADDENDUM 1A

WET CHEMISTRY

Name J.D. Franklin **Date** 01/04/94

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for Total Organic Carbon. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

sample #	constituent	value/qualifier

1A57

WET CHEMISTRY QC

Name J.D. Franklin Date 01/04/94

QC Check: BLANKS

COMMENTS: Calibration and preparation blanks were evaluated for the presence of contaminants. Calibration blanks should be run at a 10% frequency. Analytes exhibiting a concentration less than five times the corresponding blank result shall be qualified as non-detects. If the absolute value of any negative blank values exceeded the Instrument Detection Limit (IDL), non-detects were qualified as estimated (UJ) and positive results within 2 times the absolute value of the blank value as estimated.

ACTION: Contamination in all blanks made necessary the qualification of all positive results as undetected.

sample #	constituent	value/qualifier
G597	TOC	<5.50 ug/ml U
G598	TOC	<5.50 U
G599	TOC	<5.50 U
G600	TOC	<5.50 U
G602	TOC	<5.50 U
G606	TOC	<5.50 U
G607	TOC	<5.50 U
G608	TOC	<5.50 U
G609	TOC	<5.50 U
G610	TOC	<5.50 U
G630	TOC	<5.50 U
G631	TOC	<5.50 U
G632	TOC	<5.50 U
G633	TOC	<5.50 U
G634	TOC	<5.50 U

1-11-94

WET CHEMISTRY QC

Name J.D. Franklin **Date** 01/04/94

QC Check: LABORATORY CONTROL STANDARD

COMMENTS: The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of all steps in the analysis, including sample preparation. All LCS results must fall within the control limits of ± 20% of the true value. If the LCS recovery is > 120% or 50 - 79%, sample results are qualified as estimated. Results associated with an LCS recovery of < 50% are qualified as unusable.

ACTION: All criteria were met.

sample #	constituent	value/qualifier

WET CHEMISTRY QC

Name J.D. Franklin Date 01/04/94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for Total Organic Carbon consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the Total Organic Carbon analyses were actually run in triplicate. Since all sample results were qualified as non-detects as a consequence of the blank criteria, precision was satisfactory.

ACTION: No action was required.

sample #	constituent	value/qualifier

WET CHEMISTRY DATA ASSESSMENT

DATE	01/05/94	**SAMPLES/MATRIX**	G698 - G701
REVIEWED BY	J.D. Franklin JDF 1/5/94		G720 - G723
LABORATORY	222S		~~G746 - G750~~
CASE #	GROUT PRODUCT TEST		
SDG #	241-AP-102		

DATA ASSESSMENT SUMMARY

		TOC
1.	Chain of Custody/Holding Times	O
2.	Blanks	O
3.	Laboratory Control Sample	O
4.	Duplicate Analysis	X

O = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The composite nature of the original sample, and the use of the sample to manufacture a new sample source enabled the modification of some of the validation standards. The criteria for custody/holding times and duplicate analysis were modified, and the LCS data were evaluated in place of the matrix spike/matrix spike duplicate data. %RSD data were calculated for the one time interval (Sample nos. G748, G749, G750) which contained all positive results and were found to be out of control limits.

NOTES: The analyses were conducted in accordance with 222S Laboratory Procedure No. LA-344-105 B-2, at the ninety-day interval. The data were validated to 'B' level criteria.

WET CHEMISTRY QC

Name J.D. Franklin Date 01/05/94

QC Check: HOLDING TIMES

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for TOC. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

sample #	constituent	value/qualifier

WET CHEMISTRY QC

Name J.D. Franklin Date 01/05/94

QC Check: BLANKS

COMMENTS: Calibration and preparation blanks were evaluated for the presence of contaminants. Calibration blanks should be run at a 10% frequency. Analytes exhibiting a concentration less than five times the corresponding blank result shall be qualified as non-detects. If the absolute value of any negative blank values exceeded the Instrument Detection Limit (IDL), non-detects were qualified as estimated (UJ) and positive results within 2 times the absolute value of the blank value as estimated.

ACTION: All criteria were met.

sample #	constituent	value/qualifier

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin Date 01/05/94

QC Check: LABORATORY CONTROL STANDARD

COMMENTS: The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of all steps in the analysis, including sample preparation. All LCS results must fall within the control limits of ± 20% of the true value. If the LCS recovery is > 120% or 50 - 79%, sample results are qualified as estimated. Results associated with an LCS recovery of < 50% are qualified as unusable.

ACTION: All criteria were met.

sample #	constituent	value/qualifier

WET CHEMISTRY QC

Name J.D. Franklin Date 01/05/94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for Total Organic Carbon consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the Total Organic Carbon analyses were actually run in triplicate. In order to evaluate precision with respect to the three samples, the percent relative standard deviation (%RSD) was calculated for the one time interval (Sample nos. G748, G749, G750) which yielded three positive results and that %RSD (31.5%) was compared to a ±20% control limit. This interpretation of the duplicate data, however, cannot accurately determine whether the imprecision encountered with the analyses is due to method error or sample heterogeneity.

ACTION: All analysis series with detectable results were qualified as estimated.

sample #	constituent	value/qualifier	
G699	TOC	<5.50 ug/ml	UJ
G700	TOC	7.70 ug/ml	J
G701	TOC	11.0/ug/ml	J
G721	TOC	<5.50 ug/ml	UJ
G722	TOC	7.15 ug/ml	J
G723	TOC	8.80 ug/ml	J
G748	TOC	7.10 ug/ml	J
G749	TOC	9.30 ug/ml	J
G750	TOC	15.0 ug/ml	J

ADDENDUM 1A

WET CHEMISTRY DATA ASSESSMENT

DATE	01/06/94	SAMPLES/MATRIX	G597 - G602
REVIEWED BY	J.D. Franklin JDF 1/6/94		G606 - G610
LABORATORY	222S		G614 - G618
CASE #	GROUT PRODUCT TEST		G630 - G634
SDG #	241-AP-102		G637 - G642

DATA ASSESSMENT SUMMARY

		pH
1.	Chain of Custody/Holding Times	O
2.	Laboratory Control Sample	O
3.	Duplicate Analysis	O

O = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The composite nature of the original sample, and the use of the sample to manufacture a new sample source enabled the modification of some of the validation standards. The criteria for custody/holding times and duplicate analysis were modified, and the LCS data were evaluated in place of the matrix spike/matrix spike duplicate data.

NOTES: The analyses were conducted in accordance with 222S Laboratory Procedure No. LA212-102/C-5, at the 5-day interval. The data were evaluated to 'B' level criteria.

WET CHEMISTRY QC

Name J.D. Franklin Date 01/06/94

QC Check: HOLDING TIMES

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for pH. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

sample #	constituent	value/qualifier

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin Date 01/06/94

QC Check: LABORATORY CONTROL STANDARD

COMMENTS: The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of all steps in the analysis, including sample preparation. All LCS results must fall within the control limits of ± 20% of the true value. If the LCS recovery is > 120% or 50 - 79%, sample results are qualified as estimated. Results associated with an LCS recovery of < 50% are qualified as unusable.

ACTION: All criteria were met.

sample #	constituent	value/qualifier

WET CHEMISTRY QC

Name J.D. Franklin Date 01/06/94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for pH consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the pH analyses were actually run in triplicate. In order to evaluate precision with respect to the three samples, the percent relative standard deviation %RSD was calculated for each time interval. If a %RSD value exceeded 20%, the results were considered to be estimated. This interpretation of the duplicate data, however, cannot accurately determine whether the imprecision encountered with the analyses is due to method error or sample heterogeneity.

ACTION: All criteria were met.

sample #	constituent	value/qualifier

WET CHEMISTRY DATA ASSESSMENT

DATE	01/05/94	**SAMPLES/MATRIX**	G698 - G701
REVIEWED BY	J.D. Franklin 1/5/94		G720 - G723
LABORATORY	222S		~~G746 - G750~~
CASE #	GROUT PRODUCT TEST		
SDG #	241-AP-102		

1-10-94

DATA ASSESSMENT SUMMARY

		pH
1.	Chain of Custody/Holding Times	0
2.	Laboratory Control Sample	0
3.	Duplicate Analysis	0

0 = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The composite nature of the original sample, and the use of the sample to manufacture a new sample source enabled the modification of some of the validation standards. The criteria for custody/holding times and duplicate analysis were modified, and the LCS data were evaluated in place of the matrix spike/matrix spike duplicate data.

NOTES: The analyses were conducted in accordance with 222S Laboratory Procedure No. LA212-102/C-5, at the 90-day interval. The data were evaluated to 'B' level criteria.

WET CHEMISTRY QC

Name J.D. Franklin Date 01/05/94

QC Check: HOLDING TIMES

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for pH. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

sample #	constituent	value/qualifier

WET CHEMISTRY QC

Name J.D. Franklin Date 01/05/94

QC Check: LABORATORY CONTROL STANDARD

COMMENTS: The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of all steps in the analysis, including sample preparation. All LCS results must fall within the control limits of ± 20% of the true value. If the LCS recovery is > 120% or 50 - 79%, sample results are qualified as estimated. Results associated with an LCS recovery of < 50% are qualified as unusable.

ACTION: All criteria were met.

sample #	constituent	value/qualifier

WET CHEMISTRY QC

Name J.D. Franklin Date 01/05/94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for pH consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the pH analyses were actually run in triplicate. In order to evaluate precision with respect to the three samples, the percent relative standard deviation %RSD was calculated for each time interval. If a %RSD value exceeded 20%, the results were considered to be estimated. This interpretation of the duplicate data, however, cannot accurately determine whether the imprecision encountered with the analyses is due to method error or sample heterogeneity.

ACTION: All criteria were met.

sample #	constituent	value/qualifier